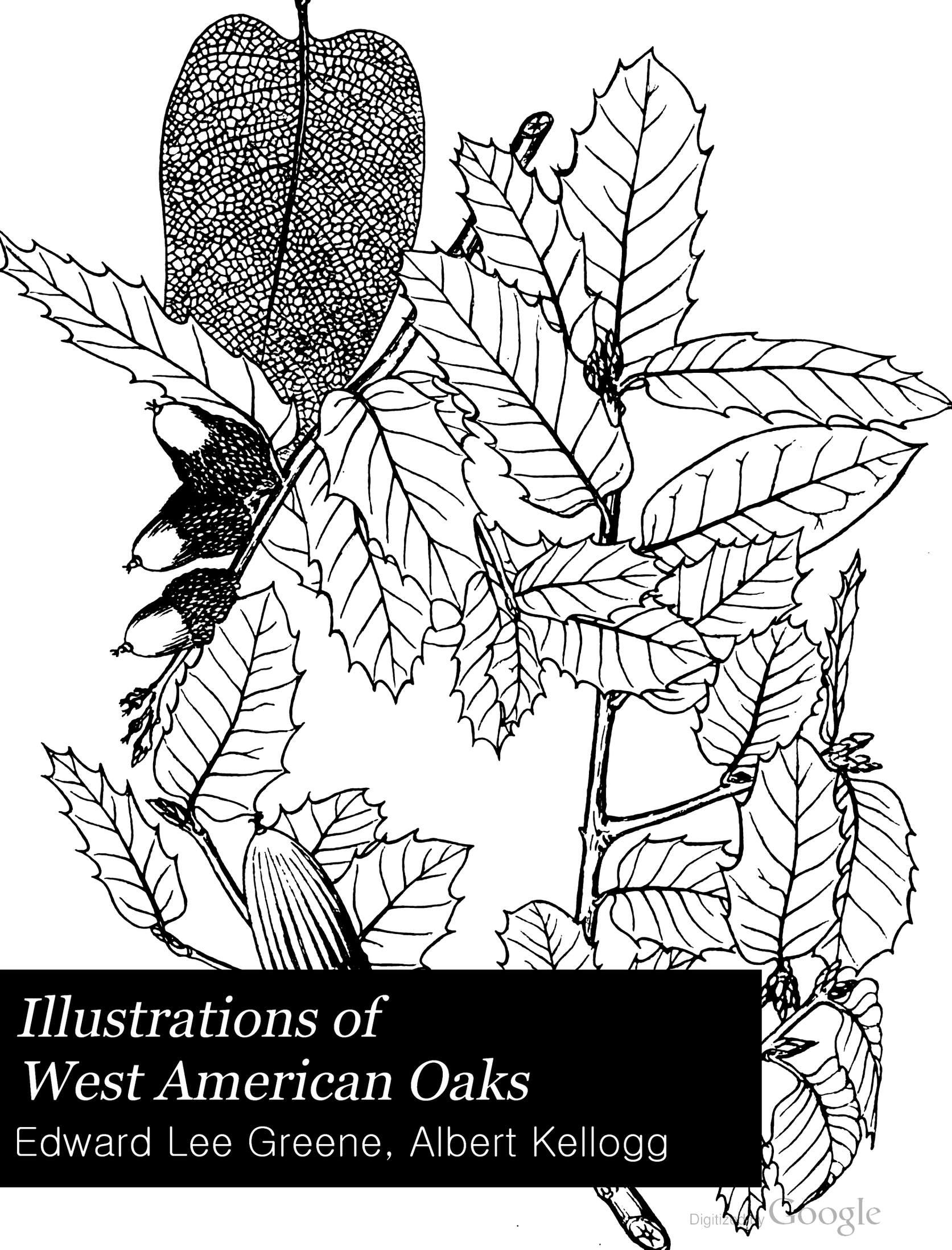

Illustrations of West American Oaks

Edward Lee Greene, Albert Kellogg

San Francisco Cal
April 25/89

With the Compliments
of Edw. Lee Greene

WEST AMERICAN OAKS.

ILLUSTRATIONS

OF

WEST AMERICAN OAKS.

FROM DRAWINGS BY THE LATE

ALBERT KELLOGG, M. D.

THE TEXT BY

EDWARD L. GREENE.

PUBLISHED FROM FUNDS PROVIDED BY

JAMES M. McDONALD, Esq.

SAN FRANCISCO,
May, 1889.

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LETTER TO JAMES M. McDONALD, Esq.

The history of the preparation and publication of this monograph is short and simple. Dr. Albert Kellogg had confided to Mr. W. G. W. Harford and to Dr. W. P. Gibbons of Alameda all his papers on Botany. They were incomplete, and there was apparently no hope of their being finished and published. Mr. Justin P. Moore and Mr. Harford asked Professor Davidson whether it was not possible to procure publication of the drawings of the Oaks of California by his appealing to Mr. James M. McDonald for the necessary means, and to Professor Edward Lee Greene of the University of California for the descriptions of the species.

The following letter continues the narrative:

ACADEMIC CLUB,

San Francisco, California, August 15th, 1888.

James M. McDonald, Esq., San Francisco, Cal.:

Dear Sir—You will remember that for some years before his death, our common friend Dr. Albert Kellogg gave his whole time to making drawings of the Oaks, Pines and other trees and plants of the Pacific Coast of the United States, and more particularly of those indigenous to this State. Upon the completion of this self-imposed labor he proposed to write descriptions of all the species and thereby fill a scientific and a practical want. He did not live to see the consummation of this undertaking.

You know how dearly he loved such work, and how thoroughly conscientious he was in its execution. His well trained eye perceived the peculiar characteristics of each species, and the delicate touch of his pen fixed the minutest details of every specimen upon paper. His drawings have received the warm commendations of critical experts.

It would be a great loss to the diffusion of scientific knowledge and to the practical forestry of the Pacific Coast if Dr. Kellogg's labors should be lost. We have therefore conferred with our good friend Professor Edward Lee Greene of the University of California, and he has cheerfully promised to write a Monograph of the Oaks of this Coast, to

be illustrated by Dr. Kellogg's drawings. With him this is a labor of love and a tribute to the memory of his friend.

We know your kindly feeling for Dr. Kellogg and your appreciation of his unselfish labor; and knowing, from years of association, your sympathy with the practical phases of scientific research, we have determined to appeal to you to furnish the money for the publication of this proposed monograph.

We have made no estimates therefor, but if you will entertain our proposition we will obtain detailed estimates for a given number of copies.

Very respectfully and sincerely,

GEORGE DAVIDSON.

JUSTIN P. MOORE,
W. G. W. HARFORD,
W. P. GIBBONS, M. D.,
JOHN CURREY,
RALPH C. HARRISON.

It would be a very pleasant duty to recount the satisfying incidents of the conference which took place. It must suffice to say that Mr. McDonald not only cordially undertook to bear the expenses of publication, and gave his check for the required amount; but he also asked for estimates for the publication of a similar Monograph of the Coniferæ. Professor Greene laid aside the preparation of a botanical work to prepare the text for the Oaks, and promised the text for the Pines.

GEORGE DAVIDSON.

SKETCH OF THE LIFE AND WORK OF DR. KELLOGG.

My friendship and my love for Dr. Albert Kellogg go back to the summer of 1867, when I had charge of the first party of the United States Coast and Geodetic Survey that went to Alaska to study the geography of its shores, and to gather information of its resources.

Dr. Kellogg was the botanist of that party, and his enthusiasm in this new field warmed all our hearts towards him. We lived in the same contracted temporary deck cabin for four or five months under many trials and inconveniences, and the sweetness of his character was as prevading and refreshing as the beauty and fragrance of the flowers he gathered.

He was completely absorbed in his duties; he knew no cessation to the labor of collection and preservation; his genial nature attracted assistance from every one, and all learned to admire and to love him.

With all his gentleness he was firm in his convictions of the right and of the truth, and was ever alert to speak earnestly and convincingly in their defense.

On this trip Dr. Kellogg's collection embraced triplicate specimens of nearly five hundred species of plants of which, by authority of the Secretary of the Treasury, I presented one to the Smithsonian Institution, one to the Academy of Natural Sciences of Philadelphia, and one to the California Academy of Sciences.

This opening of our friendship led to mutual confidence and esteem, and to my admiration for the unselfishness, the devotion and the ceaseless labor of his life. There was a oneness in his purposes that I have not known surpassed; his whole soul was breathed into plants and flowers; he loved them as if they might have consciousness. He saw in them the design and goodness of a Supreme Being who was all loving kindness.

Dr. Kellogg's singleness of purpose is well exemplified in his connection with the California Academy of Sciences. In 1853 he was one of the original seven founders of that society, when Gibbons, and Trask, and Ayer assisted in giving it a reputable standing in the scientific world by their original investigations. He worked for it and believed in its success when the number of members could have been counted on one's fingers, and when

the means of supporting such an institution and publishing its results came wholly from their professional earnings.

These men and their fellows were all enthusiastically devoted to research in this new field of the Pacific; they were almost beyond the reach of the scientific world and without its literature, but they shirked no labor and no obligation. The story of their struggles and tribulations is almost pathetic; in the early golden days it was heroic. Dr. Kellogg did his full quota of work among workers, and bore his share of the trials; he never lost hope, he inspired others with his enthusiasm, he quieted dissension; he was confident there would spread among our people a desire for that scientific knowledge which is the foundation of the practical. Beyond the wild rush for wealth and the unsettledness of that period he forsaw the growth of schools, colleges, universities and societies for every branch of scientific research. He had a cheering word for every effort, he assisted each young aspirant, he gave his time lavishly to investigation and to that diffusion of knowledge which is for the betterment of the people.

It was the unselfish and successful work of Kellogg and his colleagues through twenty years that educted the first munificent gift of James Lick, and the second still greater one. It was his devotion that subsequently elicited the noble gift of Charles Crocker for the endowment of original research. In fact, the California Academy of Sciences owes its present standing in science and wealth to the labors of Dr. Kellogg and his fellow workers.

As Dr. Kellogg's years gradually increased, the field of investigation before him seemed to expand a hundred fold, and again his singleness of purpose asserted itself. He forsook his profession to devote his life to botany; he forgot where the raiment, the sustenance and the house protection were to come from. He faithfully believed that his otherself, Harford—just as devoted and as needful as himself—would see that he was clothed, fed and protected. For the rest, his time was no longer his own; he gave it unreservedly for the benefit of his fellow men. His pencil and his pen were never afterwards out of his hands while daylight lasted. In the moments of recreation at eventide, or upon the Sabbath, his love for children prompted him to tell the story of the flowers and the beauty and majesty of the trees.

He was the embodiment of modesty in manhood. His heart was as gentle, as sweet, and as innocent as a woman's. His speech was clean and refined; always for the right, for the needy, for the struggling. He was startled at an attack upon religious purity, and then his words rose swiftly in force and directness. His soul revolted against chicanery, intrigue and the petty meannesses of the trickster, the backbiter, and the prevaricator; and his condemnation was unhesitating and piercing. He shrank from the charlatan and the sham; to him they were an unnatural growth in morals and in science. His sense of

justice and purity was so inborn that he instinctively knew the presence of the offender. His moral life charmed the young and innocent, and was an example to the best.

Through nearly twenty years of intercourse and companionship; in conference and in discussion, I recall no instance of his uttering an unjust thought, or casting an undeserved reflection: if he erred in judgment it was when he thought some one might have been condemned harshly or upon insufficient evidence. He wished that all men and women were good, and he believed there was some germ of goodness in each, although it might unfortunately be latent. To his death bed he carried the good will of his large heart towards the just, and hopeful pity towards the unjust.

I am not competent to speak of the value of Dr. Kellogg's scientific botanical descriptions and studies; that is left to authority; but I have no doubt of the excellence, and truthfulness of his illustrations. I have watched his work and have criticized its minute accuracy; it was the very faithfulness of detail with the taste of an artist. But he never took the artist's freedom for broad effects, so the botanist may rely upon the scrupulous exactness of every minute line and dot. He could not do otherwise; it would have been the unpardonable sin to have overlooked a fibre or have introduced a bud. His work is truth.

GEORGE DAVIDSON.

CAMP COLONNA, Los Angeles Base Line,
November 29th, 1888.

INTRODUCTORY.

The Oaks, for which as a genus of trees and shrubs, botanists continue to use the classical Latin name *Quercus*, are all easily recognized by that particular kind of nut-like fruit which they bear, and which is called, in our language, an acorn.

Every one knows that a certain kind of rounded or egg-shaped or cylindrically elongated thin-shelled nut, the base of which is seated in a scaly or tubercled cup of circular outline, is an acorn; and whatever tree or bush which produces acorns is an Oak.

For the present purpose, no more technical or minute diagnosis of the genus is demanded.

At least three hundred kinds of Oak are now known to botanists. About fifty of these are indigenous to North America north of Mexico. The two hundred and fifty others are distributed between the Mexican region of North America and the northern hemisphere of the Old World; and no single species is common to the Old World and the New.

The fifty North American species are about equally divided between the eastern and the western sides of the continent; and there is no Oak common to Atlantic and Pacific America.

The greater part of the species belonging to the Pacific states and territories were more or less fully illustrated by Dr. Kellogg's pencil. The twenty-four different drawings of his herein published represent all the more important species of the extensive commonwealth of California particularly, as well as several others the interest in which is mainly phytographical; and the editing of these plates has resulted in a virtual monograph of the Pacific North American Oaks. Descriptions of three or four new species or varieties have been interpolated at suitable places in the text of the plates, and some account of the other unfigured species is given at the end; so that the volume may be found to contain about all which, up to this date, is known of our West American Oaks.

The work is nevertheless in important respects only tentative. The plates alone, as far as they go, are of lasting value. The engraver has been scrupulously faithful to the drawings; and no artist was ever more strictly and conscientiously true to nature than Dr. Kellogg. Most of the Oaks which he drew have long been well known by name and

by synonym, as the Bibliography will show. The identification of the species, under the current nomenclature has not been a difficult task; but the actual limits of many of them in nature, cannot yet be said to have been at all well established. The territory which they inhabit is vast indeed. Leaving out of the reckoning Utah and Nevada, Montana and Idaho as territory upon which oaks form but a very insignificant part of the vegetation, and are wholly absent from most parts of their area; New Mexico, Arizona, California, Oregon and Washington have together an area of more than six hundred and fifty thousand square miles, upon all parts of which area oaks are more or less abundant. The wide domains of the Scandinavian Kingdom, the whole German Empire and France combined are scarcely more extensive. But the region of the West American Oaks is yet hardly half explored botanically. There must be very much yet to be learned of them in this wide field. The western botanists of half a century hence will think rightly that we knew little about them. New species will yet be discovered. The limits of old ones will be altered,—here curtailed, and there extended. All this is simply inevitable. Therefore we say the present work is merely tentative; and nothing which is here laid down respecting the geographical or the phytographical limits of species, should be taken for infallible certainty.

The Oaks of Western, like those of Eastern America and of the Old World, are of two quite different natural groups or subgenera, White Oaks and Black Oaks; and the more obvious characteristics of each group are given in the body of this paper under the headings so named. The White Oaks are, I suppose, the proper type of the genus Quercus; but I have not considered it needful to follow that order in a treatise of this kind. By reversing it, that noble Pacific Coast Black Oak which an eminent New York botanist named in honor of Dr. Kellogg, appears first on these pages, as it may fitly do, and is immediately succeeded by the one arboreal species of which Dr. Kellogg himself is the author.

Having dispensed myself from observing the conventional rule, I freely place last in the series of White Oaks, and as if it were one of them, our one particular species which a few eminent botanists have said should not be called an Oak at all. *Quercus densiflora* is, indeed, almost as much a Chestnut as it is an Oak; but, as an Oak it is obviously of that group in which it is here placed, rather than a Black Oak.

The only Western deciduous Black Oak, *Q. Kelloggii*, is much like the common *Q. rubra* of the Atlantic Slope; so much like it that, when the first specimens,—mere leaf-bearing twigs without acorns, were received in European herbaria, they were pronounced by high authorities to be only *Q. rubra;* but the acorns, when these came to be known, were found to be of a very different character from those of the Eastern analogue; and the validity of *Q. Kelloggii* as a species, is not likely to be henceforward called in question.

The case of the deciduous White Oaks of Pacific North America is different. Although one of these was, at a very early stage of its history and by a single author, Sprengel, taken up as identical with an East American species, the extraordinary size of their acorns, as well as marked peculiarities of leaf-outline, have prevented even herbarium botanists from confounding them with Eastern species.

But, as the botanical world has been learning little by little for some decades past the curious points of contact between the floras of Eastern America and Eastern Asia, and between those of Western America and Western Europe, it is not now so very surprising for us to be told that the Pacific American Oaks, of the typical group, seem more like their European than their Atlantic American kindred. As late as the year 1864, M. Alphose De Candolle expressed a doubt as to whether all three of our principal Pacific White Oaks, *Q. lobata*, *Q. Douglasii* and *Q. Garrayana* were not mere forms (not even meriting varietal rank) of the European *Q. Robur*.[1] However, this most illustrious botanist, while giving expression to his doubts, admits that a more perfect knowledge of the subjects,—the trees themselves, might remove the doubts; and, furthermore, he has at once the wisdom and the magnanimity to concede that they who first named and described the species in question may possibly have known more than he about them: so each of the species which he most doubts, he gives the benefit of doubt, placing them upon his pages as species, under the names that have been proposed, and with the descriptions which the authors gave them. Even *Q. Morehus*, then little known, and still less accredited by botanists of the other side of our continent, is accredited fully on M. De Candolle's page; and later researches are establishing the wisdom there was in his modest deference to the opinion of Dr. Kellogg, the author of the species.

There is no need that these introductory paragraphs should comprise a formal history of our Oaks as they have figured in the literature of the science. The bibliography of the species is given so nearly in full, that of each in its appropriate place in the body of the volume, that any who may desire to consult authors, have there their index of author, page and date.

It is hoped that the treatise may be found useful to all who may wish to obtain information of any kind concerning this important genus of our Western forest trees; and also that it may serve students and amateurs in the double capacity of a help, and a stimulus to further investigation. As already intimated, there is very much yet to be learned of both the geographic and specific limits of our species; and also of the economic uses, and probable usefulness of all of them.

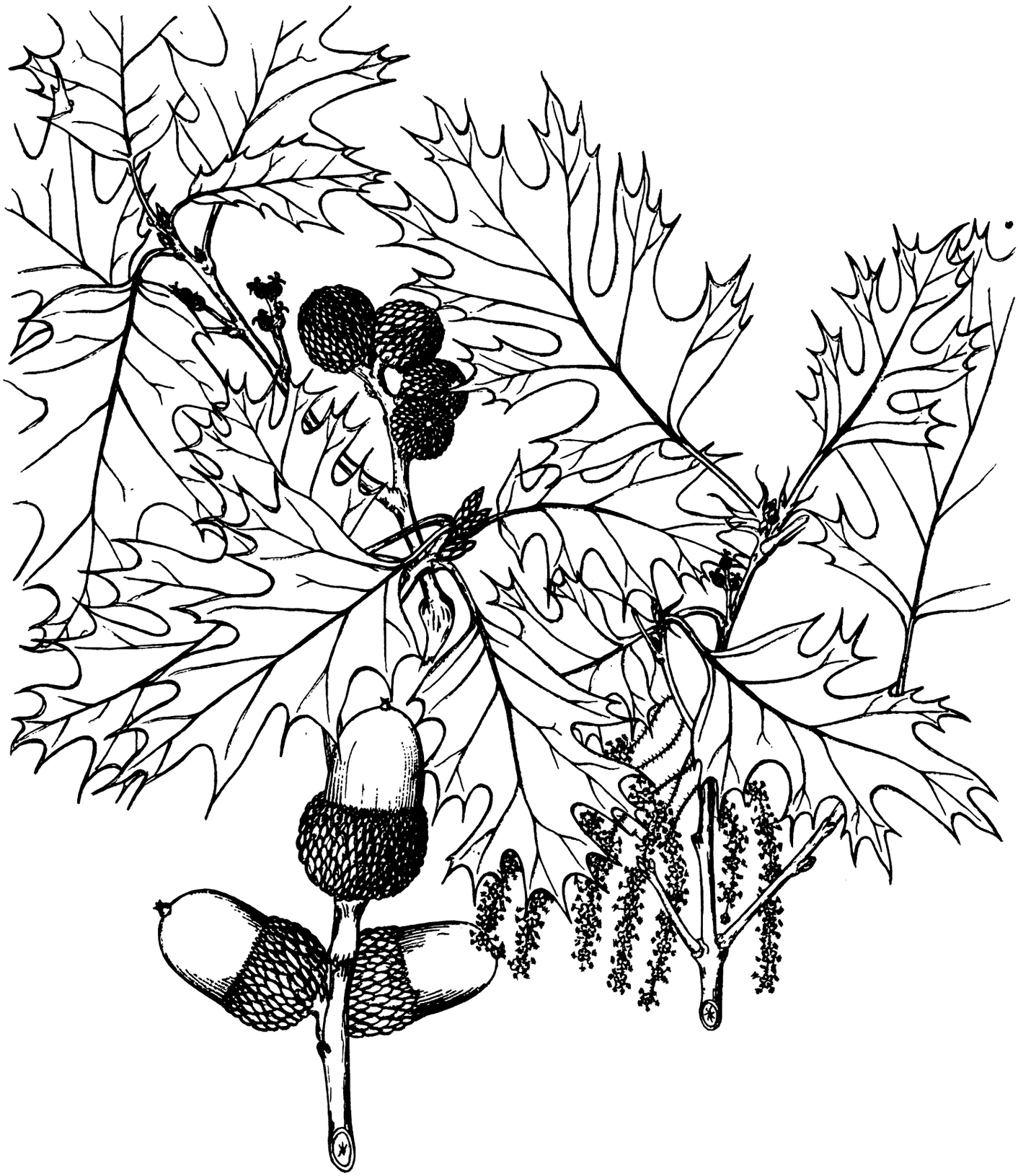
The field is vast. No one can explore it all. But one here and another yonder can

[1] Prodr. XVI.[2] p. 23, under *Q. Douglasii*.

gather and make record of new facts, correct past errors, diffuse new light. So, the more perfect knowledge, which here as in all departments of science men work for, yet wait for, will be attained.

EDWARD L. GREENE.

UNIVERSITY OF CALIFORNIA,
BERKELEY, 15th April, 1889.



QUERCUS KELLOGGII, Newberry.

WEST AMERICAN OAKS.

BLACK OAK SERIES.

Bark dark, almost black; wood reddish, coarse-grained; leaves of a dark glossy green, never pale or glaucous; their lobes, in the deciduous species, taper-pointed; abortive ovules borne at the top of the seed.

* Deciduous Species.

Plate I.

QUERCUS KELLOGGII, Newberry.

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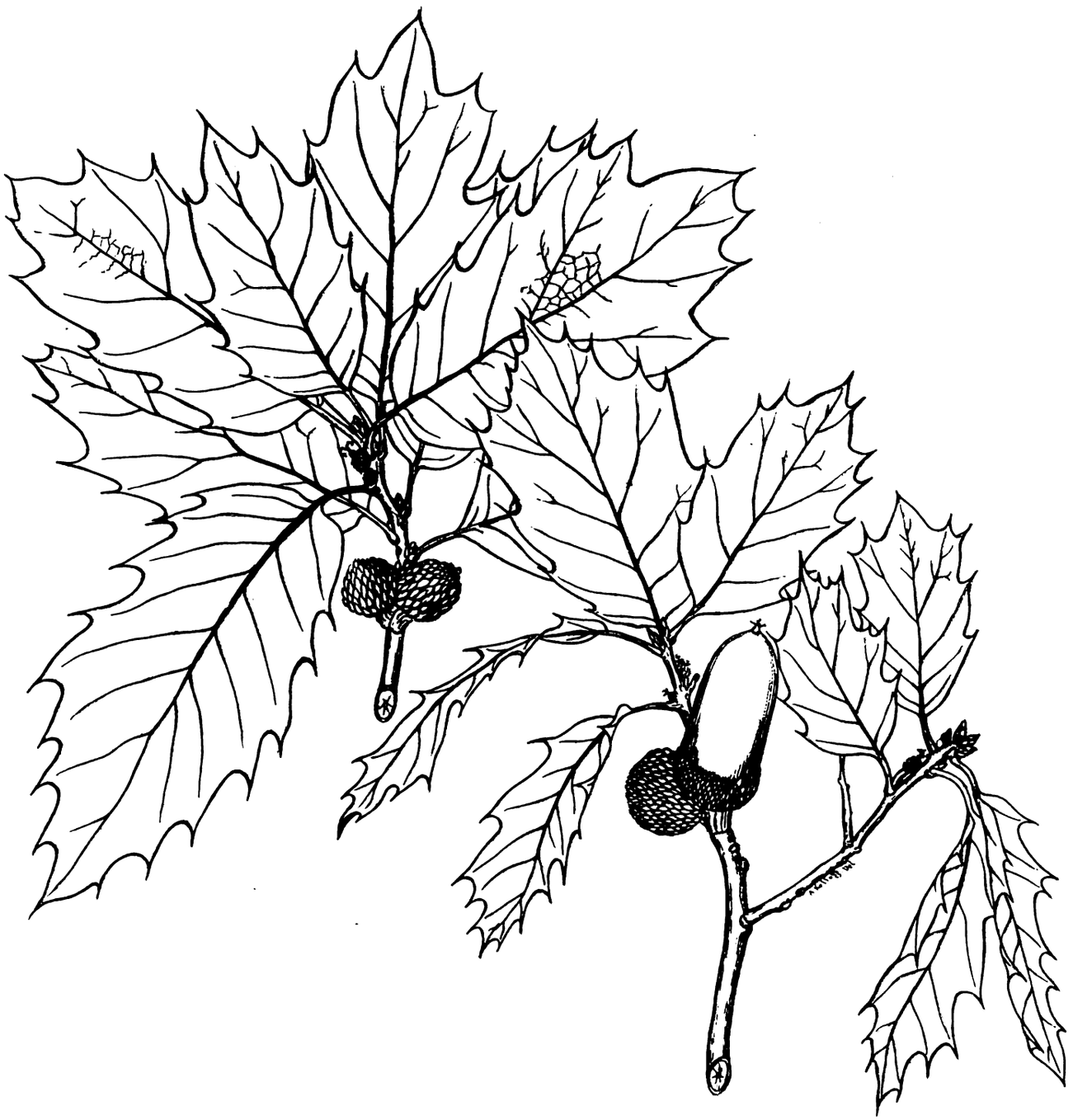
Description. Tree from forty to eighty feet high; trunk from two to five feet in diameter, clothed with a rough, dark-colored bark; branches coarse, stout, spreading or ascending, forming a rounded or elongated head, in age broadest at top; leaves from four to seven inches long, and from two to four in breadth, often widest above midway, pinnately and deeply sinuate-lobed; the lobes entire or coarsely toothed and slender-pointed; acorns maturing the second season, mostly short-stalked, growing singly, or two or three

together; cups an inch or less in breadth, usually hemispherical, and the nut exserted for half its length or more, sometimes nearly spherical and concealing all but the apex of the nut; scales ovate-lanceolate, obtuse, tomentose-pubescent; nut ovoid, obtuse, an inch long or less, often somewhat tomentose.

HABITAT. On the Coast Ranges and on the western slope of the Sierra Nevada, throughout California and as far north as the middle of Oregon; on mountain sides and summits only, or in the elevated valleys, not on the plains or near the sea. The species does not usually form a forest by itself. The trees are commonly distributed one here and another there, among other oaks, and forming groves together with several members of the white oak series; and yet, the most beautiful forests—beautiful in the stricter sense, not from a utilitarian point of view—which the present writer has seen in California are made up almost entirely of this oak. Certain broad and comparatively level-topped mountains westward from Camptonville, in Yuba County, in the middle altitude of the Sierra, are thickly wooded with it. Here its trunks are tall and straight, and branch only at a distance of thirty or forty feet from the ground, the open branches forming, over hundreds of acres, a mild shade, not too deep or too dark to exclude or weaken a rich undergrowth of wild roses (*Rosa spithamœa*) and the finer sorts of ceanothus (*Ceanothus decumbens* and *C. integerrimus.*) besides many grasses and herbaceous flowering plants.

REMARKS. This tree is the Pacific Coast analogue of the Eastern Red Oak. Dr. Kellogg, in his Forest Trees of California, says of the wood of it that it abounds in sour sap, of which it is very retentive, and dries slowly; but if this is abstracted by soaking, or even by seasoning well, it makes excellent axles for trucks, buffers for cars, and is available for many useful purposes. He also says that, although often seventy-five feet high, a trunk will seldom furnish two or three lengths of saw-log timber; this being due to the presence of what lumbermen call pin-knots, namely perforations of the trunk at the bases of branches long since fallen.

There is a considerable range of variability in the species as regards leaf-outline and the depth of the acorn-cup. That form in which the cup is nearly spherical, almost wholly enveloping the nut, ought perhaps to be named as a variety.



QUERCUS MOREHUS, Kellogg.

PLATE II.

QUERCUS MOREHUS, Kellogg.

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QUERCUS AGRIFOLIA, Bolander, Proc. Calif. Acad. iii, 229 (1866), in part.
QUERCUS WISLIZENI, Engelm., in Bot. Calif. ii, 98 (1880), in part.
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—— ——, Curran, in Bull. Calif. Acad. i, 146 (1885).

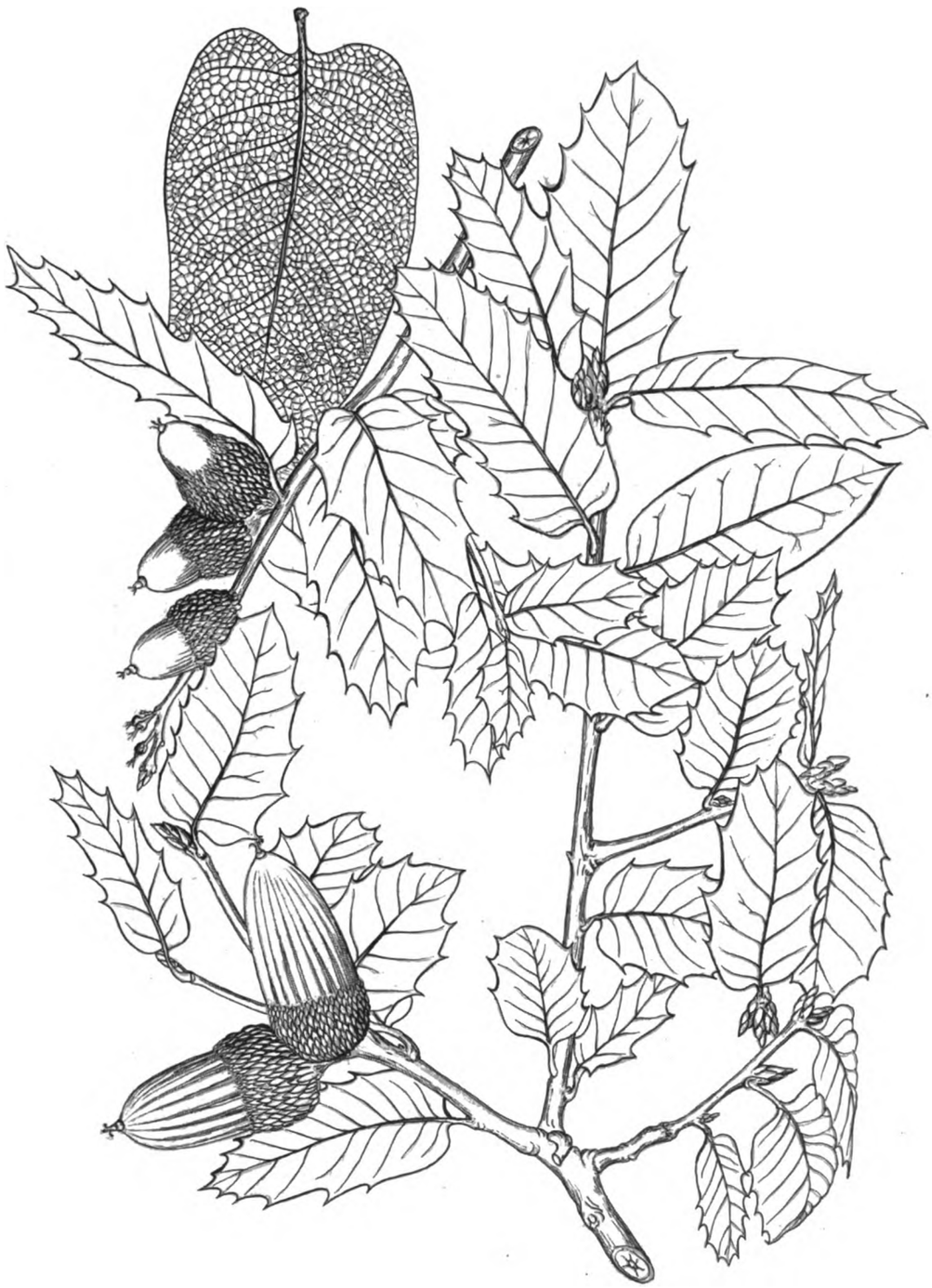
DESCRIPTION. A small tree, thirty feet high, with wide-spread straggling branches; leaves somewhat coriaceous, long-petioled, three or four inches long, oblong-lanceolate, acutish at base, coarsely sinuate-toothed, the teeth subulate from a broad base: fructification biennial: acorns solitary on peduncles a half-inch long, or less; cup hemispherical, its scales ovate, ciliate below, glabrous; nut oblong, obtuse, two-thirds exserted.

HABITAT. In the Coast Range from Lake County southward, and also along the foothills of the Sierra Nevada. Apparently nowhere common.

REMARKS. The suggestion that this is a hybrid between *Q. Wislizeni* and *Q. Kelloggii* needs confirmation. The former is evergreen, the latter deciduous, and the present species is not intermediate between the two in any point of leaf-texture or duration. It might rather be considered a variety of *Q. Kelloggii* than hybrid between that and any evergreen oak. It is only a shrub or small tree; hence of little or no economic value.

Of the origin of the specific name of this oak, in the mind of Dr. Kellogg, an account has lately been published.[1] *Q. Morehus* is, no doubt, somewhat of a barbarism; but, to either the eye or the ear it is an agreeable name contrasted with any one of the following, made by other and more learned authors: *Q. Baloot; Q. Look; Q. Tchihatcheffii; Q. Tlapuxahuensis.*

[1] Pittonia, i, 149.



QUERCUS WISLIZENI, A. De Candolle.

QUERCUS WISLIZENI, A. De Candolle.

* * Evergreen Species.

Plates III and IV.

QUERCUS WISLIZENI, A. De Candolle.

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Quercus parvula, Greene, Pittonia i, 40 (1887).

Description. A stately tree commonly from forty to seventy-five feet high, with well rounded head and a short main trunk from two to six feet in diameter; bark black and rough; leaves firmly coriaceous, smooth, dark green and shining, one to three inches long, from narrowly lanceolate to oval, entire or sinuate and spinose-toothed, usually plane, seldom at all concave beneath; petioles stout, one-fourth of an inch long, or more: fructification biennial: acorns sessile or peduncled; cup turbinate, often very deep and somewhat urceolate before maturity, covered with brown pubescent scales; nut slender, tapering, strongly marked with longitudinal lines, three-fourths to one and one-half inches long.

Habitat. Valleys and hills of the interior, back from the coast; also upon the lower slopes of the Sierra Nevada, northward to the vicinity of Mt. Shasta and southward nearly throughout California.

Remarks. The wood of this oak is hard, tough, strong and durable and of great value for mechanical purposes; also making excellent fuel. Although most distinct from the next species, some of our earlier botanical explorers appear to have confounded the two. Professor Newberry, in the Pacific Railroad Report, must have had specimens of the present oak in hand when he described the leaves of *Q. agrifolia* as being sometimes entire.

They are never so in that species. *Q. Wislizeni* is less widely distributed than *Q. agrifolia*, and does not appear to inhabit the westward slope of the Coast Range at all; but keeps itself away from the influences of the sea; whereas, *Q. agrifolia* grows in increased abundance, and often attains its largest development in the vicinity of the ocean.

I am now constrained to refer to the present species, a diminutive bush oak indigenous to the higher parts of Santa Cruz Island, which, shortly after its discovery I published as new, under the name *Q. parvula*. Its maritime habitat is, indeed, against the presumption of its specific identity with *Q. Wislizeni;* the small size of the shrub, and the somewhat different pubescence of the reduced cups, are objections more easily gotten over; but there are some mainland specimens from Mt. Tamalpais which, in these points, approach it more closely than I knew.

QUERCUS AGRIFOLIA, Née.

PLATE V.

QUERCUS AGRIFOLIA, Née.

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—— ——, Behr, Fl. San Francisco, 270 (1888).

DESCRIPTION. A ponderous tree, commonly low, the spread of branches more than equalling the height of the tree; trunk three to seven feet in diameter, the dark-colored bark smooth, except in very old trees, in which it is fissured; branches and twigs numerous, the tree presenting a rounded and close, compact head; growing twigs and young leaves stellate-pubescent: leaves oval or oblong, rarely obovate, two or three inches long, rounded at base, short-petioled, less firmly coriaceous than in the last, usually convex beneath, sinuately spinose-toothed: fructification annual: acorns sessile, or nearly so, solitary or clustered; cup turbinate, less than a half inch broad; nut elongated, tapering, one to one and a half inches long, conspicuously lineate.

HABITAT. Common in western California, chiefly in the maritime portions and south of the Bay of San Francisco; rare in the northern counties. Née, the discoverer and author of the species, in the beginning of the century, gave Monterey and Nootka as the localities whence he had obtained it; but the habitat last named must be erroneous. In the southern part of the State, perhaps especially on the Island of Santa Cruz, this tree attains its greatest dimensions, growing taller and exhibiting a more rounded head, with a less horizontal spread of branches.

REMARKS. The wood of this species is compact, hard and of great strength; but the shortness of the trunks and flexuosity of the large main branches render it unfit for sawing into boards; it however furnishes fuel of the best quality.

Like the rest of our evergreen oaks, this occurs, in some situations, in the form of a low shrub, fruiting as abundantly as in its common arboreal development. These variations in size only, hardly seem to merit separate varietal names.

On an elevated and open plateau of the Island of Santa Cruz, I observed, in 1885, a well grown tree of this species, in which all the flowers were borne on rigidly erect, stout, spike-like peduncles, each flower seeming to have been perfect, and the usual pendulous staminate aments entirely absent; so that the young acorns were all spicate. Specimens of this anomaly have been distributed among various herbaria.

Owing to its maritime habitat, this was the first West-American oak to become known in Europe; and some authors have supposed that it was in cultivation long before the days of the Spanish botanist, Née. Figure 3 of plate 196 of Plukenet, date 1691, was cited by Willdenow, doubtfully, as representing this oak; and other authors, even down to Alphonse De Candolle, in the seventeenth volume of the Prodromus (1864) have followed him. The figure referred to, I should say, represents very distinctly *Ilex opaca*; and this opinion is expressed with a mark of doubt, on the plate, in my copy of Plukenet, in the handwriting of Sprengel. But there is a figure in Plukenet which, to my eye, clearly seems to represent *Quercus agrifolia*, and that is figure 1 of plate 197. I would suggest that the error was in the naming of the figures, and that the phrase "*Ilex folio Agrifolii Americana, forte Agria*, s. *Agrifolia glandifera* Anguillaræ," should be transfered from figure 3, plate 196, to figure 1, plate 197.

Of later illustrations of the species that in Sitgreave's Report is the best, exhibiting the real aspect of the well developed leaves and the true size and shape of the acorns. Hooker's figure (Icones Plantarum 377) represents a branch from a young tree with small leaves; and the acorns, not one-third grown, are described as if mature. The plate in Nuttall's Sylva is good as to the foliage; poor as to the acorns. Dr. Kellogg's drawing, from a branch in leaf and flower, is the only one which fairly represents that profusion of staminate flowers which marks the species.

QUERCUS HYPOLEUCA, Engelmann.

PLATE VI.

QUERCUS HYPOLEUCA, Engelmann.

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—— ——, Engelm., Bot. Wheeler's Exp. 251 (1878).
—— ——, Sargent, U. S. Forestry Rep. 154 (1884).

DESCRIPTION. A small rather compact and shapely tree, thirty feet high, more or less, the trunk often a foot or two in diameter, the bark rough and black: leaves coriaceous, lanceolate, short-petioled, entire and with revolute margins or with a few teeth, dark green and lustrous above, densely white-tomentose beneath: fructification annual: acorns sessile or short-peduncled; cup hemispherical, the scales ovate-triangular, obtuse; nut ovate-oblong, well exserted.

HABITAT. Mountain districts of southern New Mexico and Arizona; also in adjacent Mexico.

REMARKS. This is a neat and ornamental small tree, the contrast between the dark green of the upper, and the white-woolliness of the lower surface of the leaves, being agreeable to the eye. The species does not form groves or thickets. The individuals are mostly somewhat isolated, and find their best development among cliffs, well up in the mountains. The parts of the country where it grows are yet scarcely settled, and nothing is known as to the possible economic value of the tree. Dr. Kellogg's is, I believe, the first published figure of the species.

QUERCUS GARRYANA, Douglas.

WHITE OAK SERIES.

Bark gray, or at least light-colored; wood nearly white, fine-grained; foliage of a light green, often glaucous; lobes of leaves in the deciduous species rounded; abortive ovules at or near the base of the seed.

* Deciduous Species.

Plate VII.

QUERCUS GARRYANA, Douglas.

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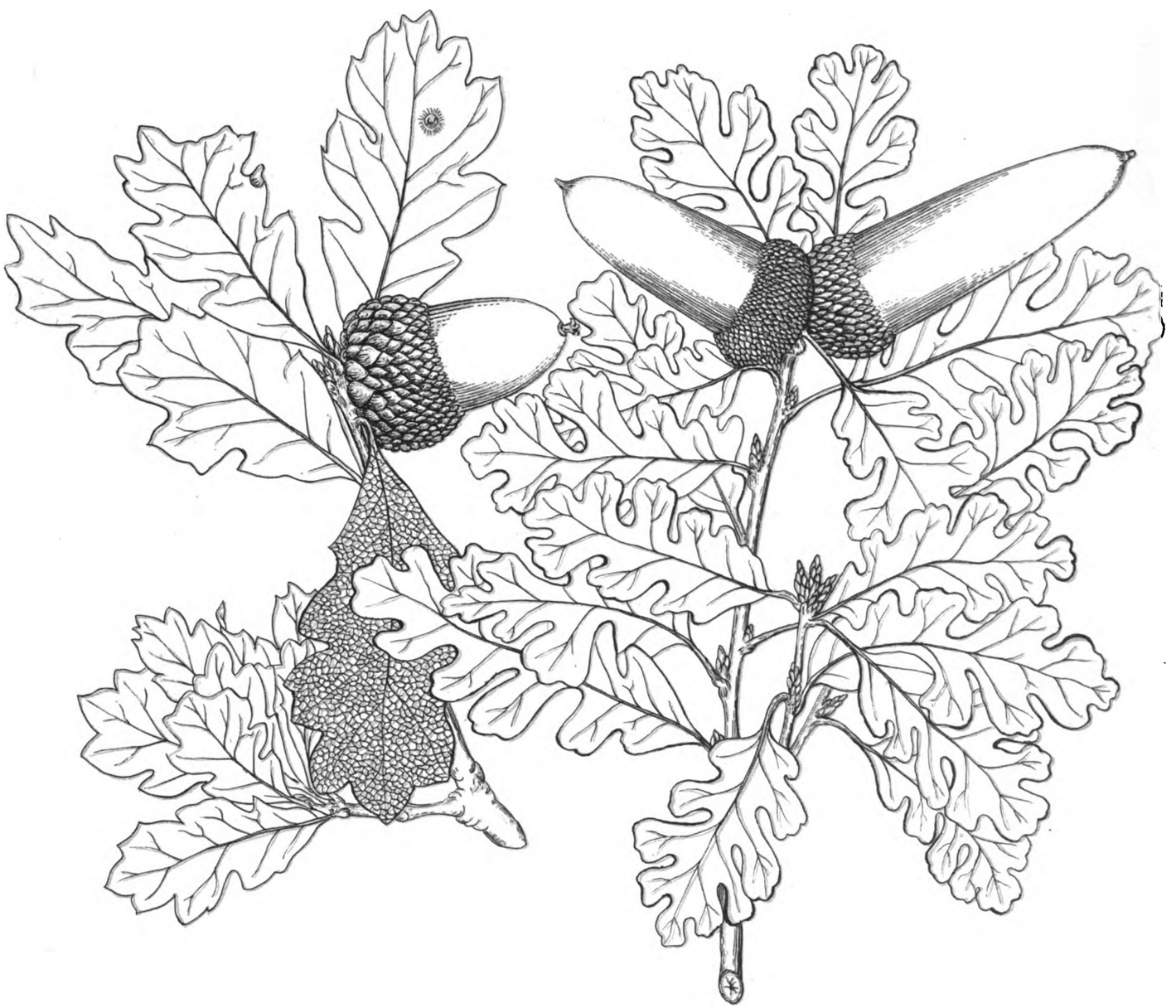
Description. From fifty to one hundred feet high, with spreading branches and loose, open head; trunk four to eight feet thick, clothed with a very light, gray bark which is finely tesselated and not very thick; branchlets thick, rigid, tomentose-pubescent; winter buds large, densely tomentose: leaves four to six inches long, on petioles of a half inch or more, obovate in outline, coarsely lobed or pinnatifid, the lobes broad, usually obtuse, entire or toothed, lower face pubescent and strongly net-veined: fructification annual: acorns nearly or quite sessile; cup small and shallow, its scales lanceolate, somewhat pubescent, flat or tuberculate-thickened at base; nut oval, obtuse, about an inch long.

Habitat. From the hills of Sonoma County at the north end of San Francisco Bay, to Puget's Sound; less common in the interior than toward the coast, and nowhere in the

higher mountains, according to Dr. Kellogg, nor yet upon the plains; but confined to the lower and middle elevations of the mountains, and known by the common name of Mountain White Oak.

REMARKS. The species is most readily distinguished from the following, to which it is nevertheless very closely allied, by its tomentose winter leaf-buds, its short acorns, and the absence of the long, wand-like, sterile branchlets which give to *Q. lobata* its peculiar drooping or weeping-willow-like aspect. It is a valuable timber tree, the wood being little inferior to that of the White Oak of the Atlantic side of the continent, and being employed for the same purposes.



QUERCUS LOBATA, Née.

PLATE VIII.

QUERCUS LOBATA, Née.

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—— ——, Sargent, U. S. Forestry Rep. 138 (1884), excl. Syn. *Q. Ransomi.*
—— ——, Behr, Fl. San Francisco 269 (1888).

DESCRIPTION. A large and stately tree from fifty to one hundred feet in height, with widely spreading, often somewhat drooping branches; trunk from four to eight feet thick, with rather dark gray bark; branchlets glabrous, elongated and rather slender, the later and sterile ones commonly several feet long and pendent: leaves obovate in outline, deeply lobed, the lobes numerous and small, obtuse or retuse, sometimes toothed: fructification annual: acorns subsessile; nut long-conical, commonly two inches long, and rather narrow and sharp pointed; cup deeply hemispherical, strongly tuberculate.

HABITAT. Throughout California, probably not passing beyond its borders either north or south; most common in the great central valley and not ascending the higher or even middle elevations of any mountain range. It is the conspicuous oak of all the inland plains, everywhere noticeable on account of its size and beauty, and is plentiful in the Napa, Sacramento and other valleys of the middle parts of the State.

REMARKS. The timber of this oak is of little value for mechanical purposes; that of young and thrifty trees only being found tough and durable. That of the older and full-grown specimens is brittle and unserviceable except for fuel. Of its large acorns it is very prolific, and appears to have been the principal bread-tree of the California aborigines. Several of the early travelers have testified to this. General Fremont in describing the country along the Stanislaus river, as it appeared in 1846, gives the following account of this oak:

"The river valley was about forty feet below the upland, and the stream seventy yards broad. making the usual fertile bottoms, which here were covered with green grass among large oaks. We encamped in one of these bottoms, in a grove of the large white oaks previously mentioned as *Quercus longiglanda* (Torr. & Frem.) This oak is a new species, belonging to the division of white oaks distinguished by the length of its acorn, which is commonly an inch and a half, and sometimes two inches. * * * The tree attains frequently a diameter of six feet and a height of eighty feet, with a wide spreading head. The many varieties of deciduous and evergreen oaks, which predominate throughout the valleys and lower hills of the mountains, afford large quantities of acorns, which constitutes the principal food of the Indians of that region. Their great abundance in the midst of fine pasture lands must make them an important element in the agricultural economy of the country."[1]

Professsor Newberry, in one of the volumes of the Pacific Railroad Survey Reports, has given so excellent an account of this tree and its uses that the passages deserve a reprint here. In speaking of a belt of them which, in 1855, were found bordering Cache Creek, he says:

"This timber belt is composed of the most magnificent oaks I have ever seen. They are not crowded as in our [East American] forests, but grow scattered about singly or in groups with open, grass-covered glades between them. The trunks, often seven feet in diameter, soon divide into branches, which spread over an area of which the diameter is considerably greater than the height of the tree. There is no undergrowth beneath them, and as far as the eye can reach, when standing among them, an unending series of great trunks is seen rising from the lawn-like surface.

The wood of this tree, like that of most of the deciduous trees of California, is porous and brittle, resembling in its want of tenacity that of the black oak, *Q. tinctoria*, of the East. This I infer to be due to the climatal conditions under which it is found, rather than to any inherent botanical peculiarity of the tree; as from its affinity with the white oak of the Eastern States, if grown in the same soil and climate the wood, in all probability, would exhibit a similar character.

[1] Frem. Geogr. Mem. of Upper Calif., p. 17.

The fruit, though having a noticeable resemblance in the color, thickness and consistence of the testa of the acorn, as well as in the character of the cup, to that of the white oak, from its conical form and great length, is readily distinguishable from that of any other species with which I am familiar. From their abundance and edible nature they form a very important part of the subsistence of the Digger Indians, and are collected and stored up by them for winter use; piles of many bushels being frequently seen in their *rancherias*." [1]

Both American and British botanists of forty years ago imagined that this noble Californian oak was then new to science, and among them they created several new names for it, which have now passed into synonyms; for the species was known in Spain at or before the beginning of the century. But no good figure of it was published until that of the Wilke's Expedition Botany appeared; and that is a faultless one, representing what may be taken as the morphological type of the species, with long and very slender acorns. The right hand figure of Dr. Kellogg is equally good, but exhibits an even larger acorn. The left hand figure, with leaves less lobed, and with shorter acorn, is possibly not of the species here under consideration. It is quite as much like *Q. Garryana* in form of leaf and the shortness of the nut; yet, on the whole, should perhaps be regarded as a mountain variety of *Q. lobata*, and may be deserving of a name as such; but further field study is called for.

[1] Newberry, Pac. R. Rep. vi, pp. 30 and 31.

1 & 2. QUERCUS DOUGLASII, Hooker & Arnott.
3. QUERCUS ENGELMANNI, Greene.

PLATE IX, figures 1 & 2: PLATE XII, figures 4 & 5.

QUERCUS DOUGLASII, Hooker & Arnott.

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QUERCUS OBLONGIFOLIA BREVILOBATA, Torr., Bot. Wilke's Exp. 460 (1874).

DESCRIPTION. Tree from forty to sixty feet high, with short trunk and broad rounded or depressed head; trunk from two to five feet thick, with light gray bark: branchlets short, rigid, pubescent: leaves of firm texture, blue-green, only two or three inches in length, oblong, sinuately lobed, or rarely almost entire, glabrate above, pubescent beneath: acorn sessile or short-pedunculate; cup hemispherical, the scales ovate-lanceolate, flat or rarely tubercled; nut elongated-oblong, an inch and a quarter long, or often somewhat less, tapering above.

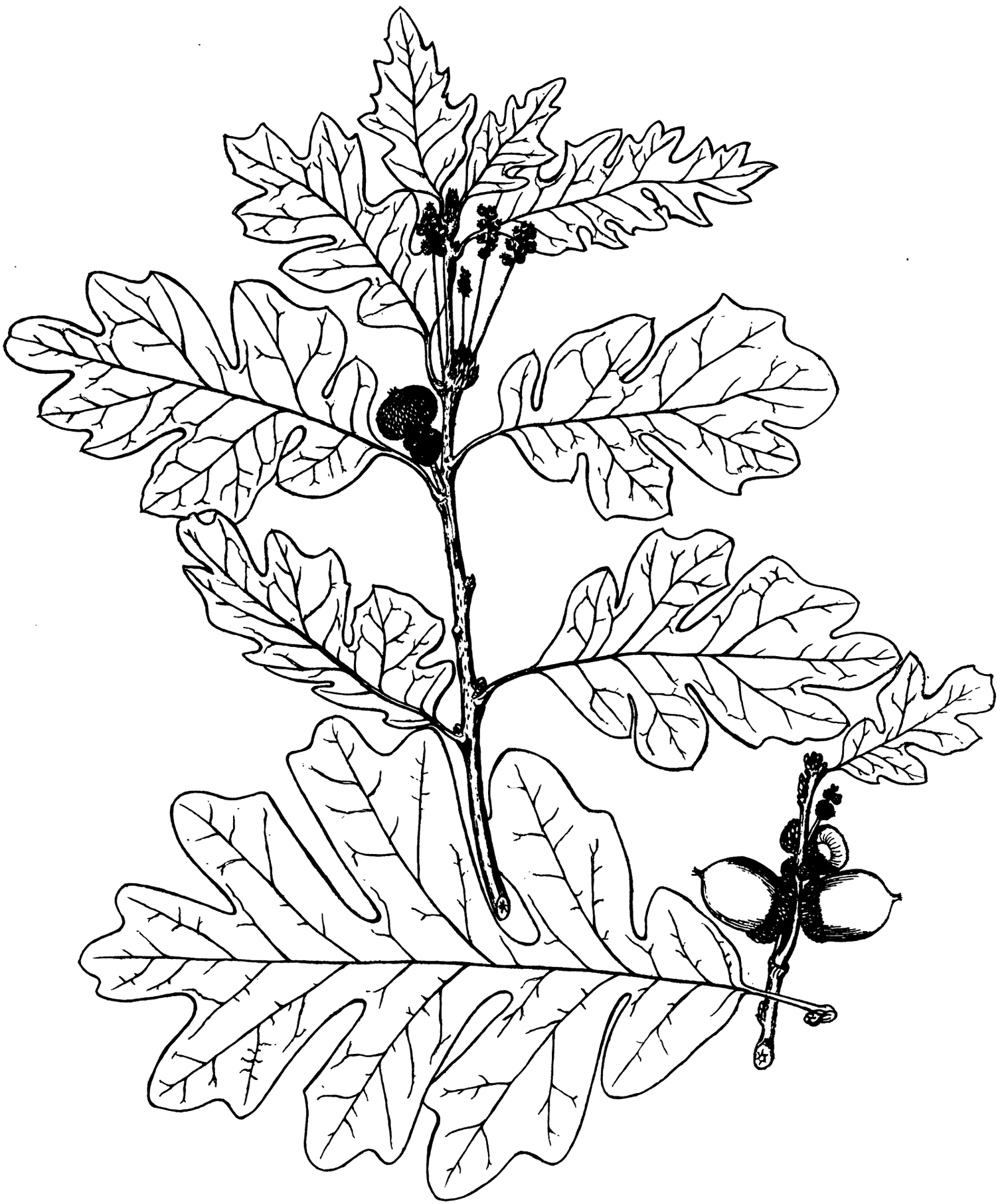
HABITAT. On low foot hills of the middle parts of California, chiefly in the Coast Range, but abundant eastward in Kern County, and northward along the lower flanks of the Sierra Nevada. It is commonly associated with *Q. Kelloggii* and *Q. Wislizeni*, and has more the habit of an old orchard-tree than any of its associates, while the bluish cast of the foliage renders the species easily distinguishable, at some distance, from even its nearest ally, *Q. Garryana*. But it is also nearly related to the evergreen *Q. Engelmanni*, a species which replaces it in the hilly districts of the southern part of the State.

REMARKS. From the peculiar color of its foliage this tree has come to be known, in

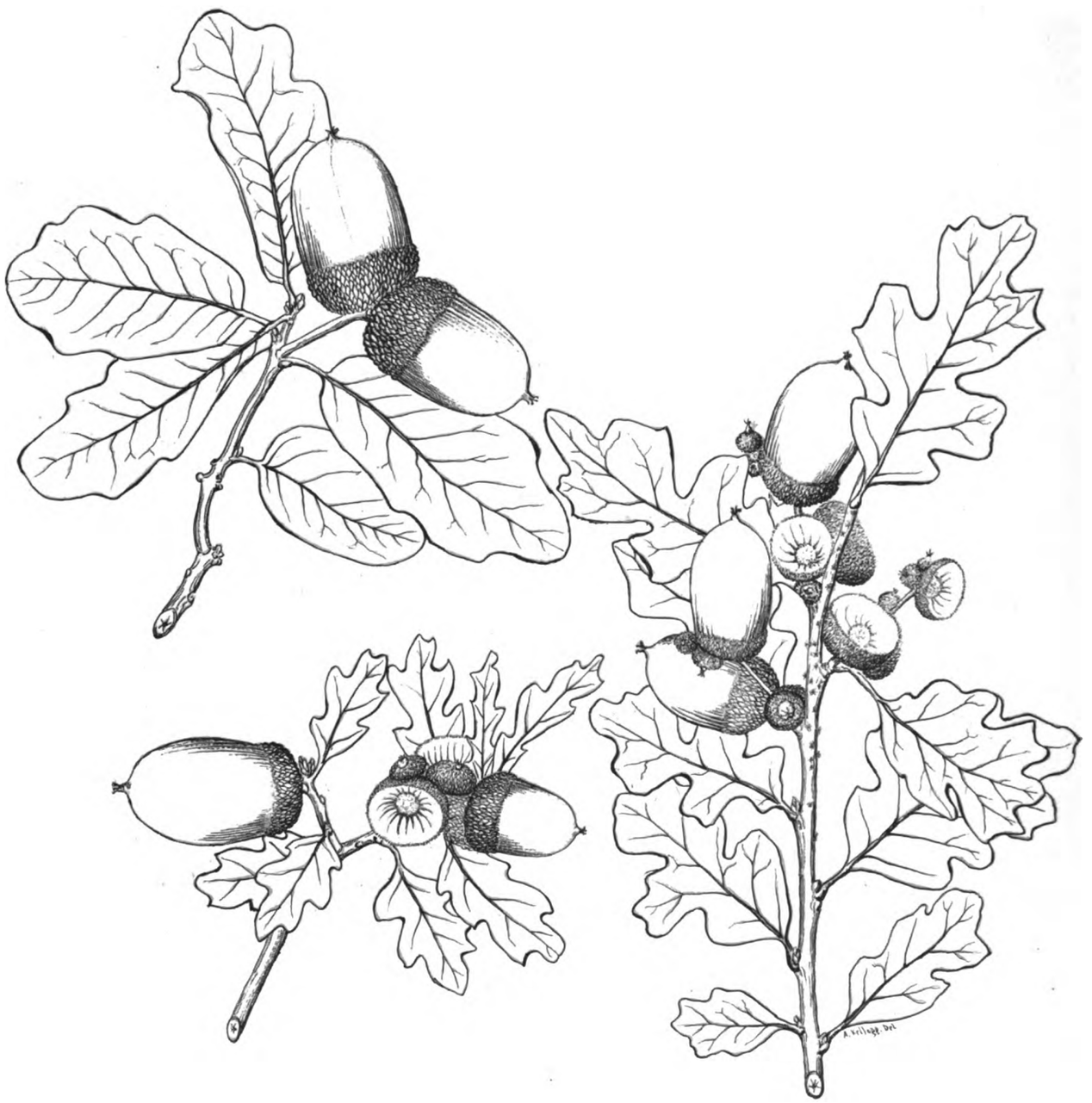
rural districts as the Blue Oak. Its wood makes good fuel, and, according to Dr. Kellogg, it has attained some reputation as material for wagon spokes, hubs and axles; but for these latter uses the timber of *Q. Wislizeni*, which grows in the same localities, is preferred.

The figure 1 of Plate IX is the only one hitherto published, which represents correctly the acorn of this species, as it appears in full maturity. That in Hooker's Icones exhibits them less than half grown; and Nuttall in the Sylva has merely reproduced the plate of Hooker: both have mistaken the acorns for full-grown ones, and have accordingly described them as "ovate." They are, in point of fact, the largest produced by any North American oak; being but little shorter than those of *Q. lobata*, and much thicker. The figure 3 of this Plate IX Dr. Kellogg has associated with his best illustration of *Q. Douglasii*, and he regarded his as referable to this species. In my judgment it is better referred to *Q. Engelmanni* on account of its acorns as much as the leaves. The specimen is from Tehachapi Pass, in the mountains of Kern County, the locality at which *Q. Douglasii* of the north and *Q. Engelmanni* of the south, appear to meet. Dr. Engelmann, in the Botany of California, made a guess that the *Q. Ransomi*, Kellogg, was *Q. lobata*; but Dr. Kellogg himself had, as long ago as 1865, identified his species with *Q. Douglasii*, and had published a note to that effect.[1]

[1] Trans. Calif. State Agric. Soc., 1864-5. p. 158.



QUERCUS ŒRSTEDIANA, R. Brown (Campst).



QUERCUS ŒRSTEDIANA, R. Brown, (Campst).

Plates X and XI.

QUERCUS ŒRSTEDIANA, R. Br. Campst.

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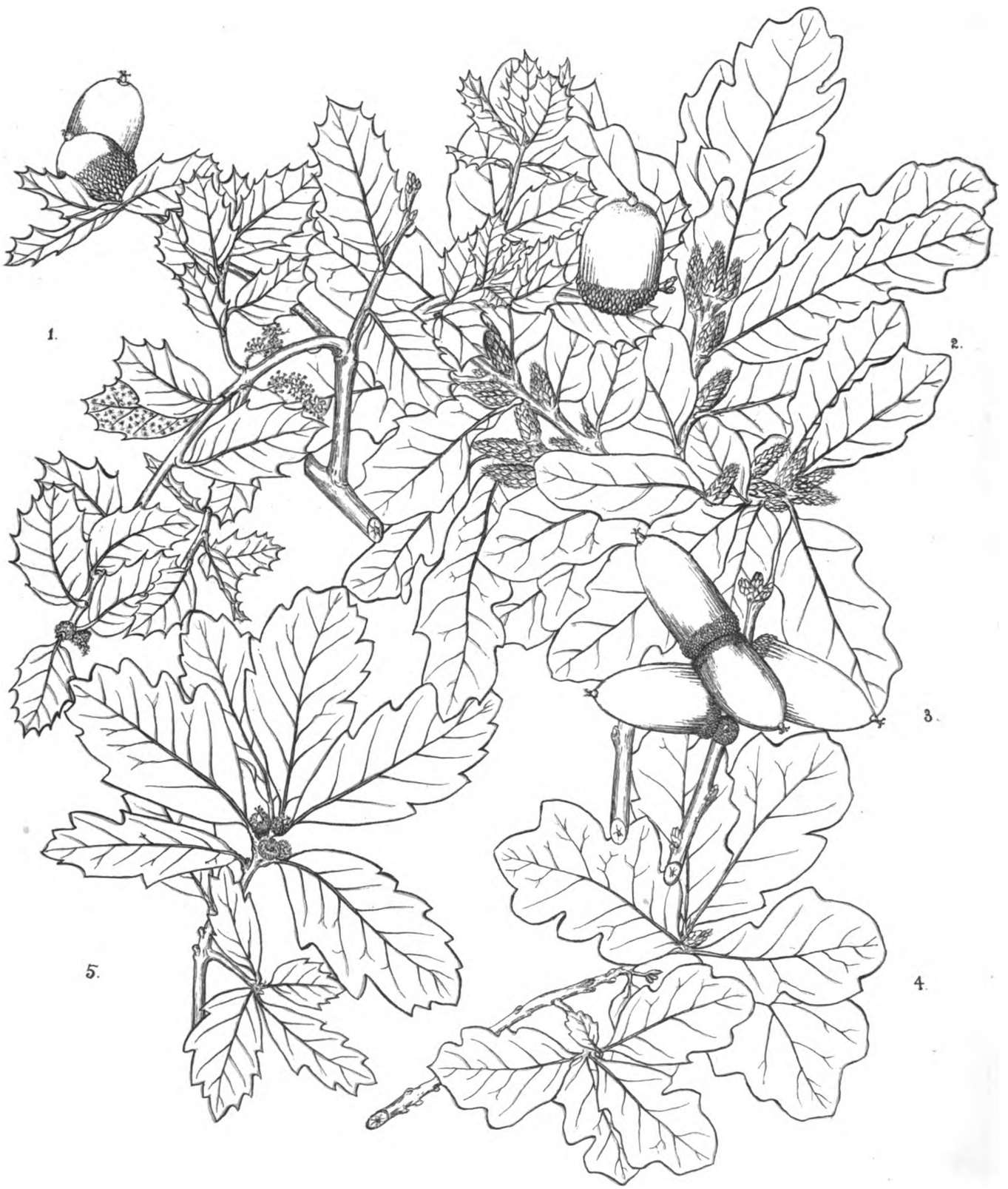
Description. Shrub from two to six feet high, the branchlets pubescent: leaves two to five inches long, usually deeply pinnatifid, sometimes merely sinuate; lobes obtuse or acutish, entire or toothed: acorns rarely subsessile, usually several, crowded near the summit of a peduncle an inch long or more; cup shallow, strongly tuberculate; nut oval, obtuse, about an inch long.

Habitat. Middle or higher altitudes of the Sierra Nevada, from Middle California to Southern Oregon.

Remarks. The two plates seem fully illustrative of the extremes of variability of this imperfectly known, though not rare oak of our northeastern borders.

Plate X represents a specimen which was brought from Modoc County, California, some years ago, by the late Hon. J. B. Redding. There is nothing in Dr. Kellogg's manuscript notes to indicate whence he had the materials of Plate XI; the figures, however, plainly represent the more reduced and stunted phases of the species. Dr. Englemann's purpose of commemorating Professor Brewer's services to botany in the naming of this oak, appears to have been thwarted beforehand. He was not aware that, as a species, the shrub had already been named in honor of the eminent Danish botanist, Œrsted.



1. QUERCUS DUMOSA, Nuttall.
4 & 5. QUERCUS DOUGLASII, Hooker & Arnott. ?

Plate XII.

Figure 1 of this plate represents *Quercus dumosa*, apparently the variety *bullata* of Englemann. The specimen was furnished by Professor Davidson, and is said to have been brought from San Rafael.

Figure 2, figure 3 probably belonging with it, is of *Quercus Douglasii* in a somewhat anomalous condition as to the large winter buds, the scales of which are in five ranks, making the bud not indistinctly pentagonal. The specimen was obtained near Antioch, in the month of October. If the acorns (fig. 3) belong here, they are very small for the species. Dr. Kellogg has recorded, in pencil on the back of his drawing, a doubt as to its being *Q. Douglasii*. One might guess, from the plate, that the buds were those of some evergreen oak, swollen by the influences of spring. The type specimens, however, indicate nothing of the kind. The label bears the date "Oct;" and I ought, in justice to the whole subject, to say that in the dried specimen the buds are rather broader, and a mere trifle shorter than the drawing indicates.

Figure 4 is a leaf-bearing twig of quite normal *Q. Douglasii;* and 5, probably a somewhat aberrant form of the same species, the leaves being more cuneate at base, and more obovate in outline than usual.

1 & 2. QUERCUS GAMBELII, Nuttall.
3 & 4. QUERCUS UNDULATA, Torrey.

PLATE XIII. Figures 1 and 2.

QUERCUS GAMBELLI, Nuttall.

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—— —— NOVO-MEXICANA, A. DC. loc. cit. 24.
QUERCUS STELLATA UTAHENSIS, A. DC. loc. cit. 22.
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—— —— ——, Sargent, U. S. Forestry Rep. 139 (1884).
—— —— ——, Coulter, Man. Rocky Mt. Bot. 333 (1885).

DESCRIPTION. A shrub of six or eight feet high, or tree of from thirty to sixty feet: trunk from a few inches to three feet in diameter, the bark pale and finely or coarsely fissured: leaves glabrous, obovate-oblong, three to five inches long, deeply sinuate-pinnatifid, the lobes oblong, entire acutish or obtuse: fructification annual: acorns sessile, or nearly so; cup hemispherical, the scales ovate, acute, strongly tuberculate-thickened at base; nut elliptical, barely an inch long, rather obtuse.

HABITAT. In its full development as a shapely, middle-sized forest tree, the species is restricted to the middle and higher elevations of the mountains of southern New Mexico and Arizona, and of adjacent Mexico. The shrubby or merely arborescent state, from central Colorado and Utah to the borders of Texas and Mexico, both in the lower mountains and, along streams, upon the plains.

REMARKS. This tree, or shrub, is more nearly allied to the common white oak

(*Q. alba*) of the Eastern United States than to any other. If it were reducible, as a variety, to any older species, Dr. Torrey's trinomial, *Q. alba Gunnisonii*, would, in my judgment, be its name.

No one of the ten botanical writers whose names are cited in the bibliography, ever saw the species, except in that reduced and shrubby form which assumes at the extreme northern limit of its geographical range. Only two or three of them have seen so much as that.

It has been my privilege to become familiar with it, not only during three years of field work in middle and southern Colorado. I have traced it all the way from the head waters of the Platte and the Arkansas, down the Rio Grande del Norte to southern New Mexico; thence westward into those elevated forest regions of the Pinos Altos, Mogollones and San Francisco Mountains of New Mexico and Arizona, where the species is really at home, and where it takes on the dimensions and the comeliness of a dignified forest tree. In those remote and still almost untraveled southwestern woods, not one of the botanists, who have hitherto passed judgments upon its rank and its relationship, has ever seen it.

Dr. Kellogg in his drawing has paid his tribute of deference to what, a few years ago, was the newly promulgated teaching of Dr. Engelmann, that *Q. undulata* and *Q. Gambelii* are one species. He has interlaced the foliage of a small and spinose-toothed evergreen, with that which plainly belong to a deciduous tree and is deeply sinuate-pinnatifid; and, under the joint figure of the two he wrote the one name "*Q. undulata*." The species last named, and *Q. Gambelii* I am persuaded are about as distinct as any two species of this white oak series inhabiting one region. It ought to be enough for the defense of this proposition to say that the former is an evergreen shrub, the latter a deciduous tree. But that is not all. The two appear to be genetically very widely separated. There is evidence that while *Q. Gambelii* is the westermost representative of the group of Atlantic American deciduous white oaks, *Q. undulata* is the most easterly species of the Pacific persistent-leaved group.

I have remarked in the introductory pages that the Pacific Coast white oaks are more like those of the Old World than they are like those of the Atlantic side of the continent. The long and dry summer season of California, lasting as it does from March until November, may have developed, in such trees as *Q. lobata* and *Q. Garryana* for example, that remarkable firmness of texture in the foliage which is one of the points wherein they differ from their eastern analogues. None of our species have the habit of retaining their leaves in a dead and dry faded and papery condition during the winter months. But the eastern white oaks do so; at least *Q. alba*, the young thickets of which, at least in the northern and middle States, are clad in a full vesture of pale and drooping thin-parchment-like dead foliage throughout all or the greater part of the winter. And *Q. Gambelii* has the comparatively thin leaves of the eastern white oak, and, in young trees, there is the

same inability to divest itself of its dead foliage in autumn. This I observed first in the mountains of Colorado, and afterwards in those of New Mexico; and the fact seems sufficient to decide the whole question of the real affinities of this tree. No one seeing this and *Q. undulata* growing together at winter time, can possibly accede to the proposition that they are one species.

Another kind of proof that the Rocky Mountain white oak is a close ally of the eastern forest tree, lies in the qualities of the wood. Before the day of railroads in Colorado, while ox-teaming was the only means of freight-transportation, the *Quercus Gambelii* was well known to teamsters as the only tree of the whole Rocky Mountain region out of whose young saplings an ox-bow could be made. The straggling evergreen, *Q. undulata*, would doubtless have failed to exhibit the necessary degree of flexibility, even if stems of sufficient length could have been found.

To this defense of the reinstatement of Nuttall's species, I am glad to be able to add the remark, that Mr. Hemsley, in his great work upon Mexican botany, has reached the same conclusion after a study of herbarium specimens alone.

The figure in the report of the Sitgreaves expedition is admirably correct; taken from an old tree, evidently. This of Dr. Kellogg represents the smoother and more slender branchlet of a young tree. His specimen purports to have come from Mt. Graham in Arizona, whence it was brought by Mr. J. G. Lemmon, whose opinion that it is distinct from *Q. undulata*, Dr. Kellogg records in pencil.

I may here introduce a Californian oak which Dr. Kellogg knew not of; one which has, indeed, remained thus far unrecognized by botanists. I gladly dedicate it to the worthy donor of this treatise, under the name

QUERCUS MACDONALDI.

DESCRIPTION. A small deciduous tree, from fifteen to thirty-five feet high, the trunk rarely a foot or more in diameter, clothed with a thin, close, gray bark, which is rather finely rimose; branches and twigs slender, numerous, forming a gracefully rounded and rather compact head: branchlets and lower face of leaves rather densely stellate-puberulent; surface of the leaves glabrate in age: leaves about two and a half inches long, on petioles of two or three lines, spatulate-oblong, the upper and broader portion somewhat pinnately lobed, the lobes acutish and mucronulate, the lower and narrow portion entire, inequilateral but obtuse at base; winter buds a line and a half long, ovate, acute, their scales indistinctly ciliolate: fructification annual: acorns sessile; cup rather deep-hemispherical, strongly tuberculate; nut ovate-oblong, acutish, less than an inch long.

HABITAT. The type above described is one of the less common trees of the Island of Santa Cruz, off the southern coast of California. I know not of its occurrence elsewhere, but expect it will be found upon the adjacent mainland. The few individuals seen by me on the island were growing upon stream-banks, in good soil, were shapely trees, apparently in healthy and vigorous condition, but bearing little fruit or none.

Along with this I place a similar small tree which is no rarity along stream-banks in the southern part of the State. I may name it var. *elegantula* of the present species. Its leaves are not spatulate, but lance-oblong in outline, and are coarsely and sharply toothed or lobed from base to apex. This species might pass for an arborescent *Q. dumosa* were it not deciduous. There are specimens of it in the herbarium of the California Academy, collected by myself in Temecula Cañon, San Diego County, 1885; others are there obtained by Mrs Curran, in Kern County, a year later, I think.

* * Evergreen Species.

Plate XIII, Figures 3 and 4.

QUERCUS UNDULATA, Torrey.

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Quercus undulata, Torr., Ann. Lyc. New York, ii, 248, t. 4 (1827).
—— ——, Nutt. N. Am. Sylv. ed. 2, 19, t. 3 (1842).
—— ——, A. De Candolle, Prodr. xvi^2, 23 (1864).
Quercus undulata Jamesii, Engelm., in Trans. St. Louis Acad. iii, 382 (1876).
—— —— ——, Coulter, Man. Rocky Mt. Bot. 333 (1885).

Description. A low evergreen shrub with numerous rigid branches; leaves an inch or two long, oblong, coarsely and pungently toothed or lobed, densely stellate-tomentose beneath, scarcely at all so above: fructification annual: acorns mostly solitary, sessile; cup hemispherical, its scales appressed; nut ovate, acute, more than half exserted.

Habitat. From the sunny cañons of Southern Colorado southward to New Mexico and westward into Arizona; at its southern limit becoming the arboreal oak of that region, which has been named variously, *Q. grisea* and *Q. oblongifolia*, both of which names should be suppressed in favor of *Q. undulata*, which has priority.

Remarks. Dr. Kellogg's specimens are of Mr. Lemmon's collecting in Arizona.

The figure in the Annals of the New York Lyceum I have not seen. That in Nuttall's Sylva is said, by Dr. Engelmann, to be a modification of it. I know of no oak-leaf quite like that which Nuttall has figured. It looks like something intermediate between an evergreen and a deciduous species. Possibly that Plate may have played a part in the confusing of the two species, *Q. undulata* and *Q. Gambelii* in the minds of several authors.

QUERCUS UNDULATA GRISEA, Engelmann.

1. QUERCUS UNDULATA, Torrey.
2 & 3. QUERCUS ENGELMANNI, Greene.

PLATE XIV; also fig. 1 of PLATE XV.

QUERCUS UNDULATA, Torr. var. GRISEA (Liebm.), Engelm.

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QUERCUS GRISEA, Liebm., Dansk. Vidensk, Forhandl. 13 (1854).

—— ——, A. De Candolle, Prodr. xvi², 35 (1864).

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QUERCUS UNDULATA, vars. GRISEA and OBLONGATA, Engelm., Trans. St. Louis Acad. iii, 382 & 392 (1876); Wheeler's Rep. 250 (1878).

DESCRIPTION. A small tree with short trunk a foot or two in diameter, and a low rounded head of short branches, the whole seldom more than twenty or thirty feet high: leaves an inch and a half or two inches long, elliptical, often cordate at base, obtuse and entire or mucronulate at apex, the margin pungently toothed or quite entire, the whole foliage of a glaucous hue above, stellate-tomentose beneath, as are also the young branchlets: acorns usually solitary on peduncles of an inch or less; cup more or less tomentose.

HABITAT. The hill-country of southern New Mexico and Arizona and southward into Texas and Chihuahua; scarcely ascending into the higher mountains except in the depths of the cañons, but scattered over the lower hills everywhere singly or in groups, and wearing the aspect of orchard trees.

REMARKS. As already indicated, the experience of several years botanizing between southern Colorado and New Mexico long ago taught me that this common oak of the Mexican Boundary region is but the full arboreal development of *Q. undulata*. It hardly deserves the varietal name with which Dr. Engelmann adorns it. The type of Dr. Torrey's *Q. oblongifolia* is only an entire-leaved state of it, but what has been called by that name in California is no doubt distinct.

It will be seen from the bibliography that, if this tree of New Mexico be recognized as distinct from *Q. undulata*, *Q. oblongifolia* will be its name, as enjoying a year of priority over *Q. grisea*.

PLATE XV, Figure 1.

This is borrowed from the Botany of the Sitgreaves Expedition, as Dr. Kellogg's pencil has acknowledged on the back of the sheet. It represents the type of Dr. Torrey's *Quercus oblongifolia.* which was a new Mexican tree, quite identical with *Q. undulata grisea*, of which it is but an entire-leaved state. The form is very common on the New Mexican hills, and has nothing else to distinguish it from the tooth-leaved state which is the more prevalent. I scarcely need add, that what is true of so very many of our western evergreen oaks, holds in respect to *Q. undulata* in most of its forms, *i. e.*, that toothed leaves and entire ones are commonly to be seen on the same tree, often on the same twig.

QUERCUS RETICULATA, Humboldt & Bonpland.

PLATE XVI.

QUERCUS RETICULATA, Humb. & Bonpl.

BIBLIOGRAPHY.

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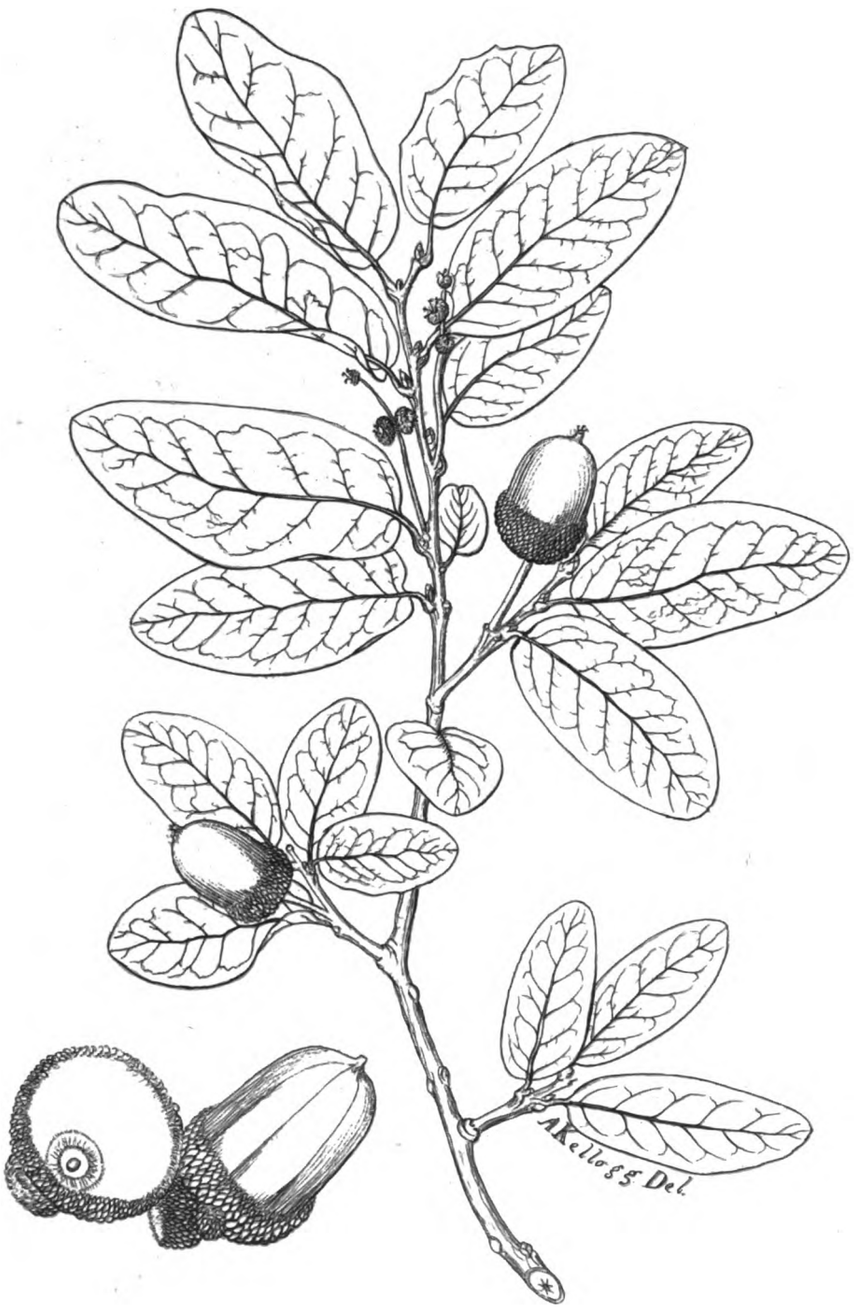
QUERCUS SPICATA, HBK. loc. cit.
—— ——, Benth. Pl. Hartw. 56 (1839).
QUERCUS RETICULATA, A. De Candolle, Prodr. xvi², 33 (1864).
—— ——, Englem., Trans. St. Louis Acad. iii, 383 (1876): Wheeler's Rep. 250 (1878).
—— ——, Hemsley, Bot. Cent. Am. iii, 176 (1883).

A small Mexican oak, closely allied to the preceding, but differing from it in a larger, more coarsely and prominently reticulate leaf, and acorns spicate at the ends of long, slender peduncles. It is of rather frequent occurrence among the mountains of the southern part of Arizona. Dr. Kellogg had his specimen from that region, through the kindness of Mr. Lemmon.



QUERCUS ENGELMANNI, Greene.

PLATE XV, Figures 2 & 3: PLATE XVII.

QUERCUS ENGELMANNI.

BIBLIOGRAPHY.

QUERCUS OBLONGIFOLIA, Engelm., Bot. Calif. ii. 96, in part, not of Torrey in Sitgreave's Report.

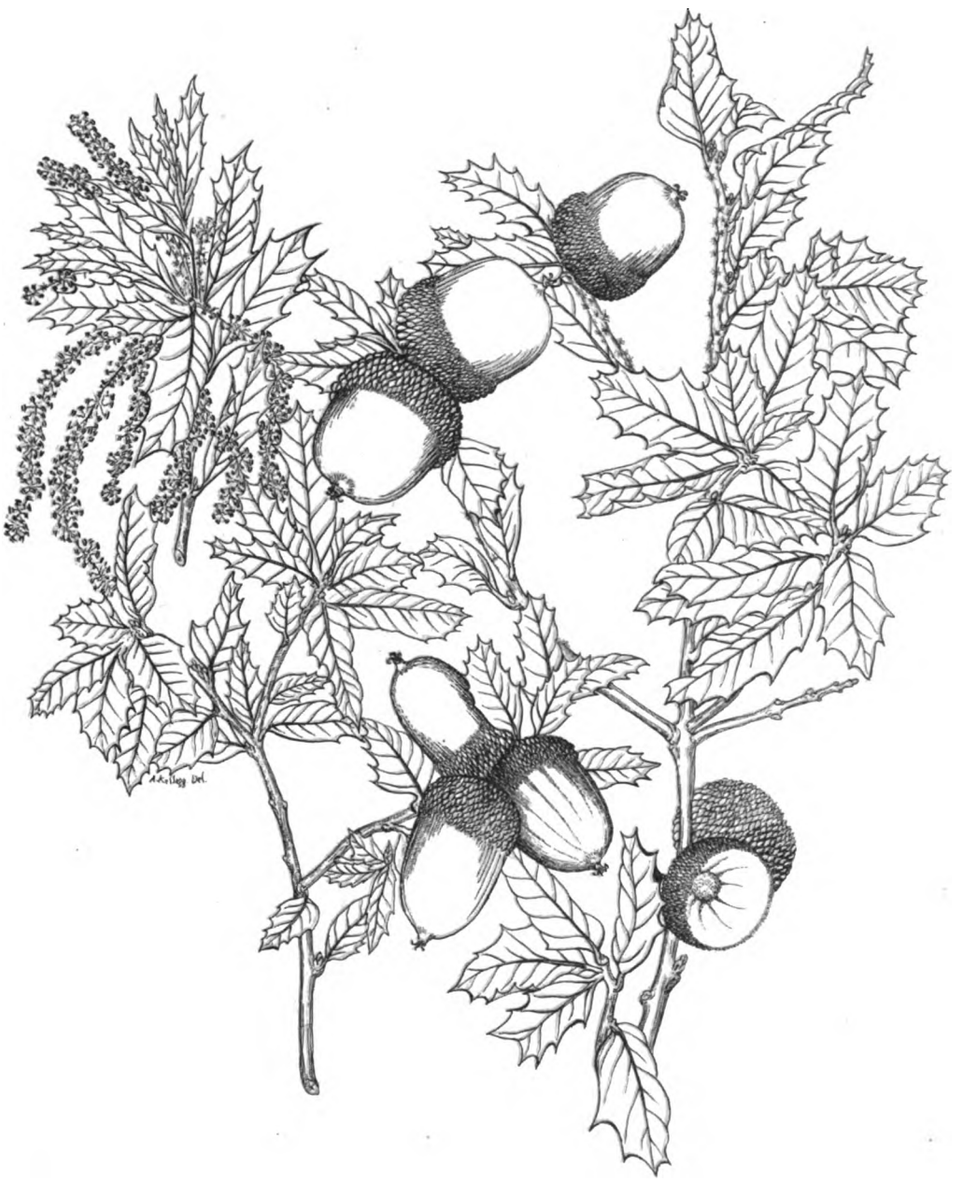
DESCRIPTION. A tree of middle size, twenty-five to forty feet high, with light-colored and rather smooth bark, a trunk from two to three feet thick, the branches spreading to form a well rounded scarcely depressed head: leaves short-stalked, oblong two or three inches long, entire, or sometimes with a few coarse teeth, obtuse or retuse at apex, rounded or slightly cordate at base, those of young shoots sometimes acutish at both ends and coarsely serrate-toothed throughout, texture coriaceous, almost without reticulation, downy-pubescent when young, glabrous when old: acorns sessile or peduncled; cup hemispherical, tuberculate; nut oblong, an inch long, lineate.

HABITAT. Mountains of southern California, from the mesas east of San Diego northward to Kern County; locally known as the Evergreen White Oak, and Live Oak.

REMARKS. This oak appears to be exclusively Californian and peculiar to the southern portion of the State. It is quite as distinct from the true *Q. oblongifolia* (which I have already referred as a form to *Q. undulata grisea*), as the Californian *Q. dumosa* is from its New Mexican counterpart *Q. undulata*. Its best specific character is found in the large striped acorn; those of the more easterly species with which it has hitherto been confounded being less than half as large and in no degree lineate. The lineation has been well brought out by Dr. Kellogg notwithstanding that he followed Dr. Engelmann in the confusing of the two species. The Californian tree is much larger in all its parts, and the leaves are quite commonly retuse or emarginate.

The suggestion that our tree is specifically different from the original *Q. oblongifolia* was favorably entertained by Dr. Engelmann, to whose memory I dedicate it.

QUERCUS DUMOSA, Nuttall.



QUERCUS DUMOSA, Nuttall.

PLATES XVIII AND XIX.

QUERCUS DUMOSA, Nuttall.

BIBLIOGRAPHY.

QUERCUS DUMOSA, Nuttall, N. Am. Sylv. i, 7 (1842).
QUERCUS BERBERIDIFOLIA, Liebm., Vidensk. Forhandl. (1854) 172, in part.
QUERCUS ACUTIDENS, Torr., Bot. Mex. Bound. 207 t. 51 (1858).
QUERCUS DUMOSA, Torr., loc. cit.
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—— ——, Greene, in Bull. Calif. Acad. ii, 412 (1887).

DESCRIPTION. A straggling evergreen bush from three to eight feet high, the twigs slender, woolly when young: leaves about an inch long, of leathery texture, oblong, obtuse, sinuate and spinose-toothed and more or less revolute, pubescent beneath, or on both sides: fructification annual: acorns sessile; cup hemispherical, strongly tuberculate; acorn oval or oblong, scarcely an inch long.

HABITAT. Dry hills of the Coast Range of California, from San Diego to Lake County; not known to occur upon even the foot-hills of the Sierra Nevada, at least in the typical form.

REMARKS. A mere scrub oak, useless except as forming a bushy covering to hill-sides, and as furnishing a copious supply of small acorns to wild fowl and rodents.

As a species, *Q. dumosa* must be admitted as rather variable, yet less so than Dr. Engelmann thought; for the bush of the Lower California Peninsula, and of the neighboring highlands of San Diego County, is of a clearly distinct species which is named and defined on a subsequent page.

The type of the species, that is to say, the shrub known imperfectly by Nuttall, and partially described in the Sylva, belongs to the hills behind Santa Barbara.

Dr. Engelmann's variety *bullata* differs from the type in the more compact mode of growth, as well as in having a foliage which is strongly convex above, and permanently tomentose-pubescent on both surfaces: and this variety has a more northerly range, occurring plentifully upon low hills in Lake County.

The shrub of the Island of Santa Cruz which I have perhaps too confidently, at a for-

mer time, referred to *Q. dumosa*, seems to present some peculiarities over and above its spicate fructification, which I at first overlooked. It must certainly take varietal or subspecific rank and may be named *Quercus dumosa*, var. *polycarpa*. It is entirely devoid of the usual pendulous staminate aments: all the flowers are perfect and borne in erect spikes: leaves larger than in the type, scarcely tomentose, least of all upon the upper surface, and equally reticulate upon both faces, or even more conspicuously so above than beneath. Perhaps this last named mark should carry it up to the rank of a species. The erect inflorescence and androgynous flowers can hardly be allowed to argue a specific difference, since upon the same island *Quercus agrifolia*, as I have indicated on a former page, varies from its type in precisely the same fashion.

In the Botany of the Mexican Boundary, under *Q. acutidens*, mention is made of trees twenty feet high. I have no doubt that all the arborescent examples hitherto referred to *Q. dumosa* belong to that South Californian deciduous tree which I have placed as a variety under *Q. MacDonaldi*, and which I almost expect will at length be found a distinct species.

The Plate of *Q. acutidens* in the Botany of the Boundary represents only a vigorous and rather large-leaved *Q. dumosa* and is, in so far as I can learn, the only figure of the species which has, until now, been published.

QUERCUS DUMOSA MUNITA, Greene.

PLATE XX.

QUERCUS DUMOSA var. MUNITA.

DESCRIPTION. A low rigid very branching shrub: twigs and foliage sparsely stellate-pubescent: leaves coriaceous, subsessile, oval from a half-inch to an inch and a half long, the margin undulate and with numerous sinuate rigidly spinose teeth: acorns solitary and sessile, or more commonly several and spicate; cup low-hemispherical, tuberculate, from a half-inch to an inch broad; nut oval, obtuse an inch long or less, indistinctly lineate.

HABITAT. Foot-hills of the Sierra Nevada, along Sweetwater Creek, in El Dorado County, California.

REMARKS. The drawing was made from specimens obtained by Mrs. Curran. It will be seen from the plate that the shrub may possibly be of biennial fructification. If this prove true, it will have to take specific rank. Typical *Q. dumosa* is not known to inhabit the hills east of the great central valley of California; and the present form is in need of further field study.

I may here insert the characters of another scrub oak, the specimens of which were brought last year from the Peninsula of Lower California, by the veteran collector and former associate of Dr. Kellogg, Mr. G. W. Dunn. This may be fitly named

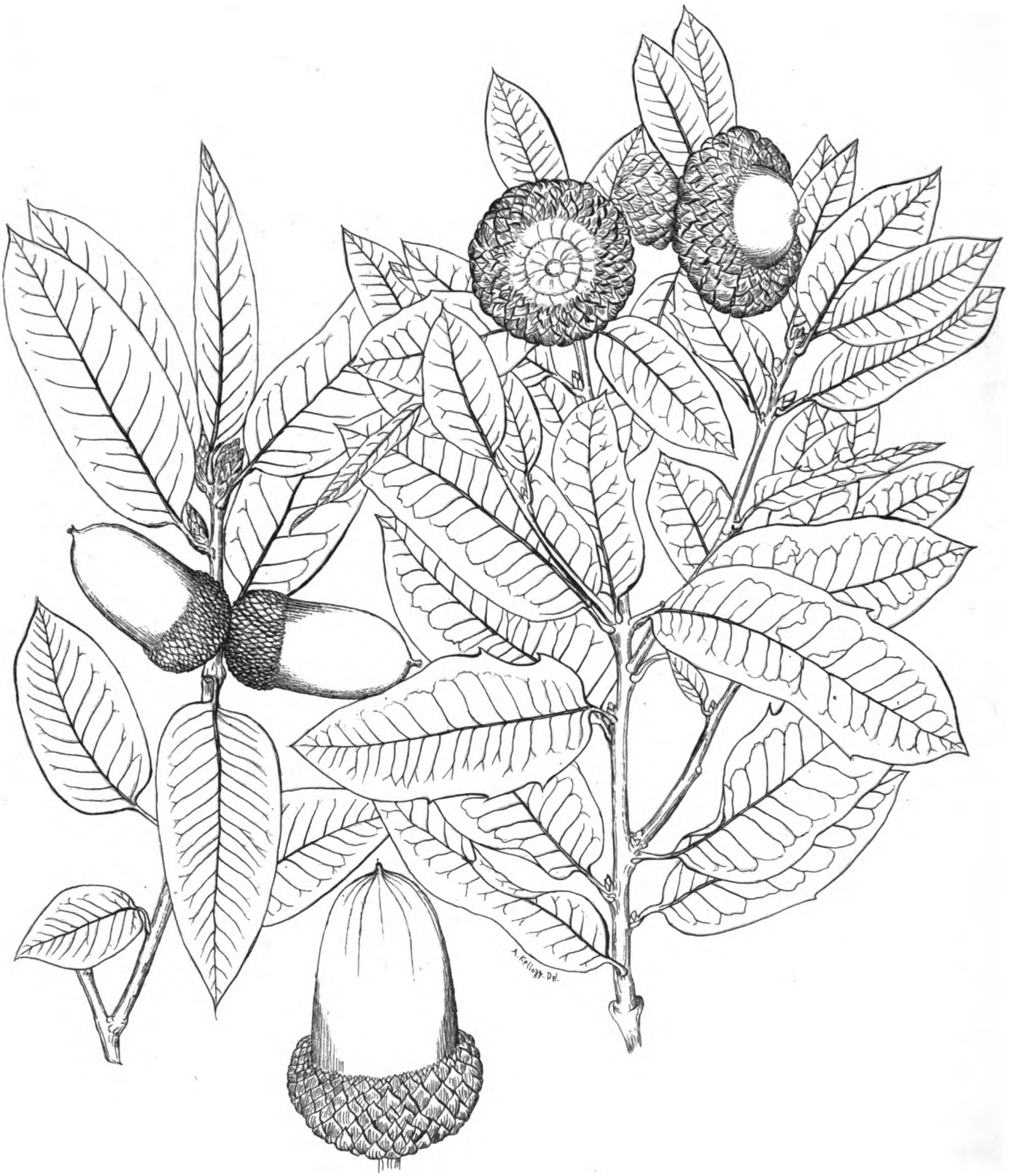
QUERCUS TURBINELLA.

DESCRIPTION. Shrub from four to seven feet high, with many rigid divergent branches, the branchlets rusty-tomentose: leaves oblong, about an inch long, on petioles of only two or three lines length, coriaceous, plane, the margins all around armed with short, spreading, spine-tipped teeth, pale on both faces, glaucous above, stellate-tomentose beneath, conspicuously feather-veined and with a minute but strong reticulation which is most obvious beneath: fructification annual: acorns solitary on peduncles from one-half to three-fourths of an inch long; cup turbinate, thin, not in the least tuberculate, from four to six lines broad, embracing the base only of the slender nut, which is only a fourth or a third of an inch thick and thrice as long.

HABITAT. The mountains of Lower California, where it is associated with the rare and characteristic *Q. Dunnii;* also within the borders of the State of California about Campo, in San Diego County.

REMARKS. This peninsular scrub oak was collected by the writer in the mountains of San Diego County as long ago as 1877. The specimens, exhibiting nothing but the leaves, were referred by Dr. Engelmann somewhat doubtfully to *Q. dumosa.* Mr. Dunn's excellent specimens, obtained some twenty or thirty miles below the United States boundary in September, 1888, are laden with full grown fruit, and with the acorns and their very characteristic thin-walled flat-scaled turbinate cup leave no doubt that the species is distinct from all the West American bush oaks hitherto defined. Even the foliage is sufficiently unlike that of *Q. dumosa;* and the same may be said of the whole bearing and aspect of the shrub. Its relation to that species is about such as its geographical associate, *Q. Dunnii*, sustains to *Q. chrysolepis.*

QUERCUS CHRYSOLEPIS, Liebmann.



QUERCUS CHRYSOLEPIS, Liebmann.

PLATES XXI & XXII.

QUERCUS CHRYSOLEPIS, Liebmann.

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—— ——, H. De Candolle, Prodr. xvi², 37 (1864).

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—— ——, Sargent, U. S. Forestry Rep. 146 (1883), excl. *Q. vacciniifolia.*

—— ——, Behr, Fl. San Francisco, 269 (1888).

DESCRIPTION. A small or large tree, usually thirty or forty, seldom eighty or one hundred feet high, the trunk sometimes five feet or more in diameter, oftener but two or three feet; the bark flaky and of an ash-gray color: branches in young or small trees erect or ascending and rather compact, otherwise loose and spreading: foliage pale and glaucous, or else of a bright shining green above and yellowish-pubescent beneath; leaves oblong, acute, entire or spinose-toothed, of coriaceous texture and an inch or two long, on very short petioles: fructification biennial: acorns solitary; cups hemispherical or saucer-shaped, from a third of an inch to more than an inch wide, the scales triangular, appressed, more or less hidden by a dense yellowish tomentum; nut oval, obtuse, from a half-inch to an inch and a half long.

HABITAT. From southern Oregon to the Lower California peninsula, in the Coast Ranges; also on the islands of Santa Cruz and Cedros; and among the foot-hills of the

Sierra Nevada; the low bush of the higher elevations being doubtless a distinct species (*Q. vaccinifolia*, Kell.).

REMARKS. Professor Sargent speaks of the present species as being "An evergreen tree of great economic value. * * Wood heavy, very strong and hard, tough, close-grained, compact, difficult to work. * * * Somewhat used in the manufacture of agricultural implements, wagons, etc.; the most valuable oak of the Pacific forests[1]."

The tree is known by the common name of Maul Oak; also, like any of our evergreen oaks, it is often called Live Oak. Mr. Bolander, in his interesting notes published in the third volume of California Academy proceedings, proposed for it the very suitable name of Drooping Live Oak.

Although quite widely dispersed, it is the scarcest of all our oaks, at least in its large-arboreal development. There are no forests or groves of this species, but solitary trees occur here and there, mostly in ravines and gulches, or on cool northward slopes of the more elevated hills of the redwood region. Fruit of it has seldom been found, except in its smaller and more prevalent forms; and these forms are in need of more careful observation and study than has yet been given them. No doubt a number of very well marked varieties, or subspecies in want of names and faithful descriptions, are included under this one specific name, in our books and catalogues.

Neither Dr. Kellogg's drawing, nor the earlier plate in the fifth volume of Pacific Railroad Reports, shows that peculiar variety of cup in which the scales are hidden by a dense close coat of yellow tomentum. The form alluded to appears to be common in the southern portions of California, and will very likely prove indicative of a more than varietal divergence from the type of *Q. chrysolepis*.

[1] U. S. Forestry Report, p. 146.

QUERCUS DENSIFLORA, Hooker & Arnott.

QUERCUS DENSIFLORA, Hooker & Arnott.

Plates XXIII & XXIV.

QUERCUS DENSIFLORA, Hooker & Arnott.

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—— ——, Nuttall, N. Am. Sylv. i, 11, t. v (1842).
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—— ——, Newberry, Pac. R. Rep. vi, 31, 89 (1857).
Quercus echinacea, Torrey, Pac. R. Rep. iv, 137, t. xiv (1857).
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—— ——, Bolander, Proc. Calif. Acad. iii, 231 (1866).
Pasania densiflora, Œrsted, Vidensk. Meddel. 73 (1866).
Quercus echinoides, R. Brown, Campst., Ann. & Mag. Nat. Hist. Apr. 1871, 2.
Quercus densiflora, Bolander, Catal. Pl. San Francisco, 27 (1870).
—— ——, Engelm. Trans. St. Louis Acad. iii, 380; Bot. Calif. ii, 99 (1880).
—— ——, Kellogg, Forest Trees of Calif. 69 (1882).
—— ——, Behr, Fl. San Francisco, 270 (1888).

Description. A bush of from three to ten feet high, or a stately and symmetrical tree of from seventy to one hundred and fifty feet, the trunk rarely six feet in diameter, its bark roughly fissured in old trees, smoothish and gray in the young state; branchlets densely tomentose: leaves coriaceous, two to five inches long, oblong, acute or obtuse at apex, acute at base, the margin entire and revolute or dentate, or coarsely serrate, very light green and glaucescent above, densely tomentose beneath: aments erect and dense (pendulous and loose in all our other oaks), entirely staminate, or staminate above and pistillate below, from four to six inches long: fructification biennial: cups shallow, from three-fourths to one and one-fourth inches broad, covered with linear-subulate, loose, spreading or recurved, or longer, more slender and somewhat tortuous scales; nut oblong, an inch long or more, obtuse or acute at apex and obscurely triangular above the middle, more or less tomentose without and within.

HABITAT. From the Umpqua Valley in Oregon to the Santa Lucia Mountains in California, chiefly along the coast and in the redwood region, also extending to the Sierra Nevada in the more northerly localities: most frequent and of largest development along streams and in mountain ravines in moist rich soils; but common on dry and sterile hill-tops, in the bushy form.

REMARKS. This is the most remarkable of all North American oaks; to the botanist especially, a tree of surpassing interest. Nuttall, in the Sylva, speaks of it as "Scarcely a true oak, but congeneric with species in the Himalaya Mountains, in India." Its erect and densely flowered staminate aments are those of the chestnut rather than of the oak; and the soft-prickly clothing of the cup is another point of contact with *Castanea;* besides the nut itself, while it does not appear to be "more convex on one side," as Nuttall seemed to think, is most certainly a little triangular even at full maturity, when viewed from above; and the shell of the nut is much thicker and harder than in any other species of either oak or chestnut of our continent at least. In view of all these considerations, there are better grounds than our American botanists of later years have seen, for the genus *Pasania* of Œrsted. As far as our California species goes, *Castanopsis* is even a less valid genus than *Pasania*. In our opinion it must, in all reason, be referred to *Castanea* by those whose estimate of generic characters places in *Quercus* the tree here described.

Whenever this species attains the dimensions of a tree, whether small or great, it is, as Dr. Kellogg has remarked, the most regular and symmetrical of oaks; and it is certainly among the most beautiful of Californian forest trees. The large proportion of tannin which its bark contains renders it one of the most useful of our trees; and the many cargoes of this bark which are annually landed in San Francisco from the northern coast counties may make botanists apprehensive of a final extinction of the tree. Among the woodmen it is commonly known as the Tan Bark Oak. Chestnut Oak is a name which we suspect may have been given it by the botanists. Mr. Bolander learned that "Its wood is absolutely useless; it is very coarse-grained, and, like the redwood, wet as a sponge when cut; it is extremely perishable. At Mendocino City log-men call it Water Oak."

The original figure in Hooker's Icones is very bad, conveying no idea at all of the remarkable cup. That in Nuttall's Sylva is a poor reproduction of the same. These misleading representations were what led Dr. Torrey to suppose that, in his *Q. echinacea*, he had a wholly distinct and new species. I have never seen the scales or bristles of the cup so much deflexed as his figure would indicate. Dr. Kellogg's drawing, which our engraver has faithfully reproduced in Plate XXIV, is a perfect representation of the cups as they appear in that low and bushy form which may possibly be a distinct species, and which Mr. Robert Brown has pronounced such, it being doubtless his *Q. echinoides.*

Messrs. Victor Chesnut and Elmer Drew, students at the University of California, who have botanized carefully in the woods of Humboldt County, assure me that the woodmen of those regions insist upon two different kinds of the Tan Bark Oak, which they readily distinguish. But I am not aware of the existence of any constant characters from which two species, or good varieties even, may be made out.

OTHER WESTERN OAKS.

Q. EMORYI, Torr., Emory's Report, 151. t 9 (1848). An evergreen Black Oak of Arizona and New Mexico; a shapely tree seldom more than thirty feet high, with small lanceolate cordate, often somewhat hastate repandly spinous-toothed leaves, and annual fructification, the small acorns one-third immersed in the scaly hemispherical cup.

The fact that this is a Black Oak had been singularly overlooked by the late Dr. Engelmann (who had placed it among the White Oaks on account of the position of the abortive ovules), and was first pointed out to him by the present writer, in 1877, while botanizing in southern New Mexico.

Q. TOMENTELLA, Engelm., Trans. St. Louis Acad. iii. 393 (1876); Bot. Calif. ii. 97. An evergreen White Oak of the islands off the coast: related to *Q. chrysolepis*, from which it differs in having a stellate pubescence and strongly ribbed foliage.

The species was first discovered by Dr. Edward Palmer in 1875, on the Lower Californian island Guadalupe, where also the present writer observed it ten years later. It seems to exist on Guadalupe only in a few more than middle-sized trees, at the cool, foggy summit of the north end of the island; and in a scarcely more considerable number of smaller, and smaller-leaved trees (possibly not of the same species) in the hot and dry cañons of the eastward slope. We found the species on the island of Santa Cruz in 1886, but in no abundance even there.

Q. VACCINIIFOLIA, Kellogg, Proc. Calif. Acad. i. 96. A small but compact and elegant shrub of the higher Sierra Nevada, thoroughly evergreen, and of the White Oak group; related to *Q. chrysolepis*, to which it is doubtfully referred as a variety or subspecies by Dr. Engelmann. It is very leafy, and its small entire leaves, these and its young branches being wholly destitute of the fulvous-lepidote pubescence of *Q. chrysolepis*, seem to mark it well enough as at least a fairly good subspecies.

Q. DUNNII, Kellogg, Pacif. Rural Press, (7 June, 1879): *Q. Palmeri*, Engelm., Bot. Calif. ii. 97 (Oct., 1879). An evergreen White Oak of the northern part of the Lower Californian peninsula, doubtless is also to be found north of the U. S. boundary: foliage much like that of some forms of *Q. chrysolepis*, but the habit different: the species particularly well marked by erect aments and turbinate thin cups; both leaves and cups fulvous-lepidote.

Dr. Kellogg's name for the species one is bound to adopt; for it has priority, although by four months only, over that proposed by Dr. Engelmann.

Q. SADLERIANA, R. Brown Campst., Ann. & Mag. Nat. Hist. vii. 249 (1871); S. Wats., Proc. Am. Acad. xxii. 477. A deciduous White Oak bush of the mountains of Oregon and northern California: leaves oblong-obovate, acute, cuneate at base, pinnate-veined and coarsely and sharply toothed; fructification annual: acorns sessile; cup shallow, tuberculate; nut oblong, obtuse, less than an inch long.

The species is a comparatively new and interesting one. Mr. Howell, the well known Oregon botanist has twice collected it since it was discovered by Mr. Brown in 1865; but it seems not to be common.

Q. JACOBI, R. Brown Campst. l. c, of Vancouver Island is even less known than the last. It has passed for *Q. Garryana*, according to Mr. Watson, who thinks it may be distinct. It should be investigated carefully by our friends of the northern coast.

SUPPLEMENTARY.

After page 3 of the text was in print I had an opportunity of observing for the first time, the winter condition of *Quercus Morehus*, and was not a little surprised at finding its leaves all green and fresh as late as the end of February; almost or quite the time for the swelling of the spring buds. The tree is therefore not deciduous. The leaves are as persistent as in the common *Q. agrifolia*.

The group of trees above referred to was found by me in a new locality, at the northern base of Mt. Tamalpais, in Marin County, California; and, inasmuch as both *Q. Kellogii* and *Q. Wislizeni* grow there, the former with *Q. Morehus* and the latter on the mountain's higher slopes, the locality does not preclude possibilities of a hybrid origin; although the fact that the foliage is scarcely intermediate in point of texture or duration still holds.

Still later, even as late as the middle of March, I have come upon another growth of *Q. Morehus* in a place where I had never thought of looking for it. This is upon the very crest of the hills behind Berkeley; forming part of a low thicket, which I had never thought of examining because it was always understood that all these scrub-oak copses were of *Q. agrifolia;* the only kind of oak heretofore observed on all this long range of Oakland and Berkeley hills. The thicket of which *Q. Morehus* here forms a part, is of an acre's extent, more or less; and my attention was first drawn to the fact that the middle part of this thicket was abruptly depressed, *i. e.*, the bushes forming it being all at once of only half the height of those on either side. The near view of this lower growth revealed at once the peculiar foliage of *Q. Morehus;* while upon one side of it the thicket was all *Q. agrifolia*, on the other, all *Q. Wislizeni*. At this place and date all three of the species were developing their early spring shoots with new foliage, all still retaining the leaves of one or two preceding years.

I may pretty confidently assert that *Q. Kelloggi* is not likely to be found within ten or twelve miles of this spot. It certainly does not grow in the Berkeley or Oakland hills, nor upon the low lands at either base of them.

It is, in my mind, well established, that *Q. Morehus* is no hybrid, but a clear species, most related to *Q. Wislizeni*, but differing from it constantly in habit as well as in the whole outline and size of the foliage; varying, as do most of our oaks, from a large tree to a low shrub, according to the locality and surroundings.

BERKELEY, 25th March, 1889.

INDEX.

WEST AMERICAN OAKS.

WEST AMERICAN OAKS

PART II.

SAN FRANCISCO,
June, 1890.

PUBLISHED APRIL 25TH, 1889.
SAN FRANCISCO, CALIFORNIA.

PREFATORY.

Upon the publication of the first part of the West American Oaks, Mr. McDonald was impressed with the necessity of further examination and study of the new species and varieties mentioned therein. These had not been known to Dr. Kellogg: the systematic plan of collection, investigation and representation, which was his life work, was broken by declining health and by adverse circumstances.

After a few copies of the work had been sent out, the further distribution was suspended until the new species should be illustrated; and Mr. McDonald suggested that special examination should be made to secure satisfactory specimens. When the matter had been fully discussed Professor Greene volunteered to give his summer vacation to the field work in the Sierra Nevada, and in the Rocky Mountains of Colorada and Montana. Mr. McDonald generously bore all the expenses of this trip, and the result has been the verification of former species and the acquisition of new ones. Professor Greene has since employed his hours outside of University duties in the description of all these species, and in the direction of the drawing by Mr. George Hansen.

It was at first proposed to omit all of the first part of this Volume after page 44, but finally decided to add the second part thereto, in order to make the history and bibliography of the work complete.

GEORGE DAVIDSON.

SAN FRANCISCO, CALIFORNIA,
April 26th, 1890.

We have been enabled to present in this Second Part, plates of some ten kinds of Oak never before figured: namely, *Q. Palmeri*, *turbinella*, *tomentella*, *Macdonaldi* and its variety *elegantula*, *Q. Fendleri*, *Jacobi*, *Gilberti*, *venustula*, and the *polycarpa* form, or rather state of *Q. dumosa*. The other three here taken up anew, *Q. undulata*, *Gambelii*, and *Garryana*, although figured in earlier works, were in need of more thorough elucidation. From this list of names it will be seen that these later thirteen plates should surpass, in point of scientific value, the twenty-four earlier issued.

It is a matter of some regret that, of several of the forms to be illustrated we had no acorns. The time of year at which our journeyings had to be made was unfavorable to the collecting of these. They are not well formed, as a rule, before September or October; and we were obliged to pass from the fields where oaks chiefly abound, before the end of July. But in general the characteristics of the oak-species reside more in the outlines, texture and duration of foliage, in the bark and wood, and in the bearing and aspect of the tree as a whole, than in acorns. There are many instances in which closely related, yet quite distinct species, have acorns nearly or precisely alike. Hence these, although always to be desired, are not always indispensable to the satisfactory limitation and sure identification of species.

We should have liked well to have been able to produce plates of *Q. Emoryi* of Arizona, and of the rare *Q. Sadleriana* of the Siskiyou Mountains in southern Oregon. But neither the necessary materials of these, nor of Dr. Kellogg's *Q. vacciniifolia* were available.

In the new elaboration of those shrubs of the Rocky Mountains previously referred to *Q. undulata*, we have received most efficient help from Dr. N. L. Britton of Columbia College, New York, who has in charge the Torrey Herbarium wherein are preserved the types collected so long ago by Dr. James and Mr. Fendler. To enable us to determine the geographical limits of *Q. Garryana* and *Q. Jacobi*, Mr. John Macoun, Botanist to the Canadian Geological Survey has given us the privilege of inspecting the bundle of specimens accumulated by the Survey; and Mr. Charles V. Piper of Seattle, Washington has favored us with all that he has collected in his region. To these gentlemen we would here offer our grateful acknowledgments. Like services rendered by friends nearer home will find record elsewhere in the work.

EDWARD L. GREENE.

UNIVERSITY OF CALIFORNIA,
May 14th, 1890.

QUERCUS PALMERI, Engelmann.

* EVERGREEN WHITE OAKS continued from page 43.

PLATE XXV.

QUERCUS PALMERI, Engelmann.

BIBLIOGRAPHY.

QUERCUS PALMERI, Engelm. Trans. St. Louis Acad. iii. 388 and 393 (1876; as a subspecies); Bot. Calif. ii. 97 (Oct. 1879; as a species).
QUERCUS DUNNII, Kellogg, Pacif. Rural Press, (June 7, 1879).
—— ——, Curran, Bull. Calif. Acad. i. 146 (1885).
—— ——, Greene, West Am. Oaks, 38, 46 (1889).

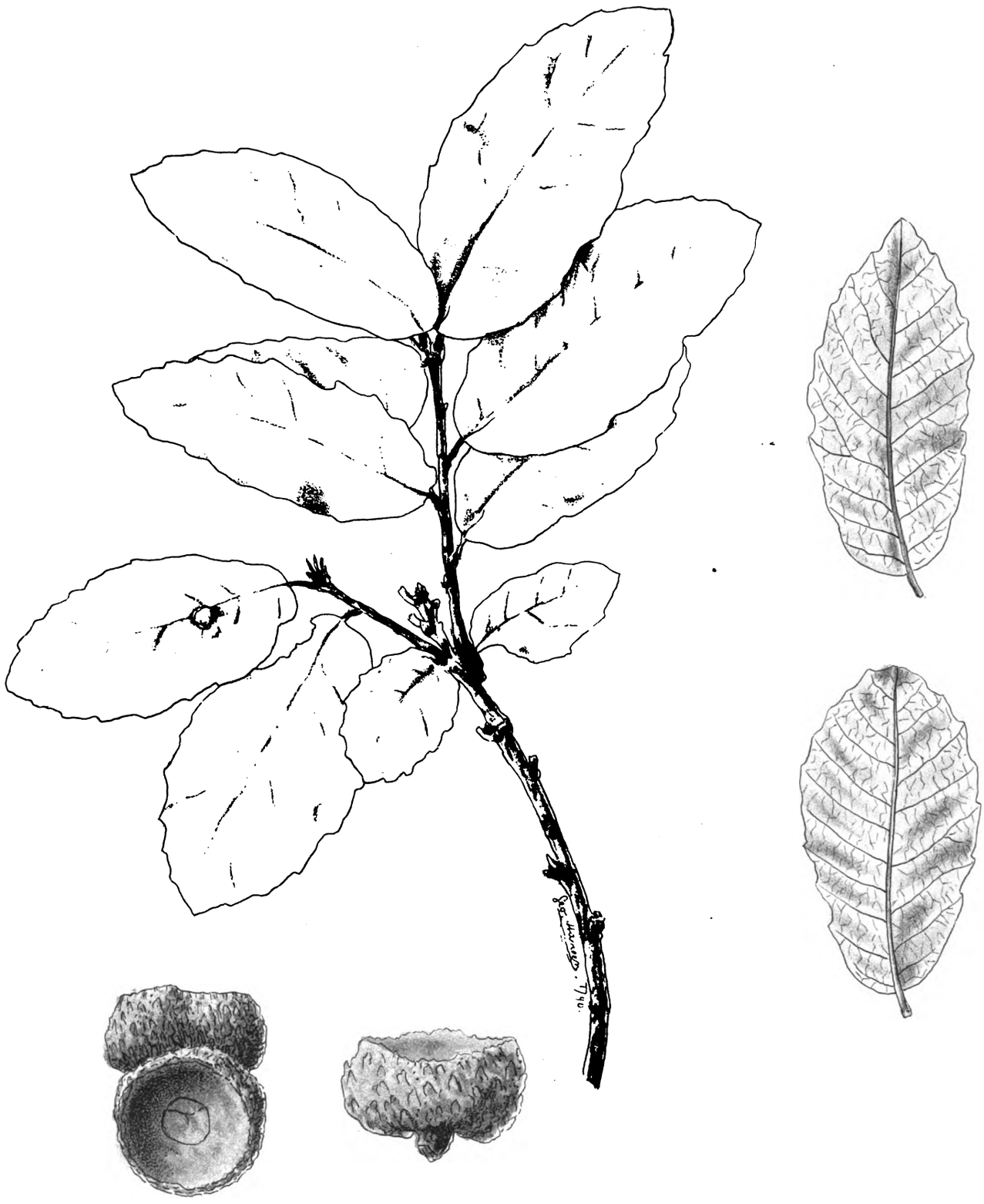
DESCRIPTION. A clustered shrub, sometimes twelve or fifteen feet high, with stout rigid divaricate branches; growing branchlets and lower face of leaves invested with a yellowish deciduous tomentum; branchlets of former years glabrous, smooth, ashy gray: leaves from three-fourths to one and a fourth inches long, coriaceous, very pallid, oval, truncate or slightly rounded at base, abruptly acute at apex, undulate, coarsely and irregularly spinose-toothed, or some of the smallest entire: staminate flowers light cream-color in very dense and greatly elongated aments (four or five inches long): fructification biennial: acorns subsessile; cup turbinate, six to nine lines wide, the scales concealed by fulvous tomentum, the margin involute and uneven; nut an inch long, ovate, acute, tomentose at apex and within.

HABITAT. Mountains of the southern part of San Diego County, California, and southward upon the peninsula, no one knows how far. The drawing was made from specimens brought by Mr. Dunn, the original discoverer of the species, from eighty miles below the United States boundary, and were collected in September, 1888.

REMARKS. This very distinct and peculiar oak, although bearing most likeness in foliage and habit to *Q. chrysolepis*, has no little affinity for *Q. densiflora*, as its remarkable chestnut-like inflorescence clearly indicates.

It is to be noted that, in the Botany of the California Survey, Dr. Engelmann quoted himself as having published it as *Q. chrysolepis, var. Palmeri.* This quotation of himself is wrong. And the editors of Dr. Engelmann's Collected Works, in a foot note to page

407 have repeated the error. If they had looked up the place ("page 383" of the third volume of St. Louis Academy Transactions), they would have found there no allusion to this oak whatsoever. It was not known to him at the time page 383 was printed. But, at page 392 of the same volume, printed more than a half year later, in "Additional Notes," under a reference to "page 383" preceding, where *Q. chrysolepis* is the topic, he brings out the *Q. Palmeri* for the first time, though not at all as a variety of *Q. chrysolepis*. These are his words: "Another extreme and somewhat aberrant subspecies, I name for its discoverer *Q. Palmeri*;" and thereupon follows the description. It is the rule, with botanists who do not recognize subspecies in nomenclature, to treat subspecific names as equivalent to specific. Under this rule, the name *Q. Palmeri* will antedate *Q. Dunnii;* though the description by Dr. Kellogg, under the latter name, is by far the better of the two; and it was Mr. Dunn who discovered the tree, and conducted Dr. Palmer to its habitat.



QUERCUS TOMENTELLA, Engelmann.

Plate XXVI.

QUERCUS TOMENTELLA, Engelmann.

Bibliography.

Quercus chrysolepis, Engelm., Proc. Am. Acad. xi, 119 (1876), not of Liebm.
Quercus tomentella, Engelm., Trans. St. Louis Acad. iii, 388 & 393 (1876); Bot. Calif. ii, 97 (1879).
—— ——, Greene, Bull. Calif. Acad. i, 218, (1885), ib. ii, 412 (1877).
—— ——, Brandegee, Proc. Calif. Acad. 2 ser. i, 217 (1888).
—— ——, Greene, West Am. Oaks, 45 (1889).
—— ——, Sargent, in "Garden and Forest," ii, 471 (1889).

Description. Tree of middle size, symmetrical and compact, the branchlets tomentose: leaves oblong-lanceolate, three or four inches long, on petioles as many lines in length, obtuse at base, acute or rounded at apex, crenate-toothed or entire, plane or with revolute margins, coriaceous, densely tomentose when young, glabrous above when old: aments and oval calyx-lobes stellate pubescent: nut of large size, ovate, set in a broad and not deep hemispherical cup which is soft tomentose within, and externally distinctly scaly, the scales large and triangular, usually with more or less of a ligulate apiculation.

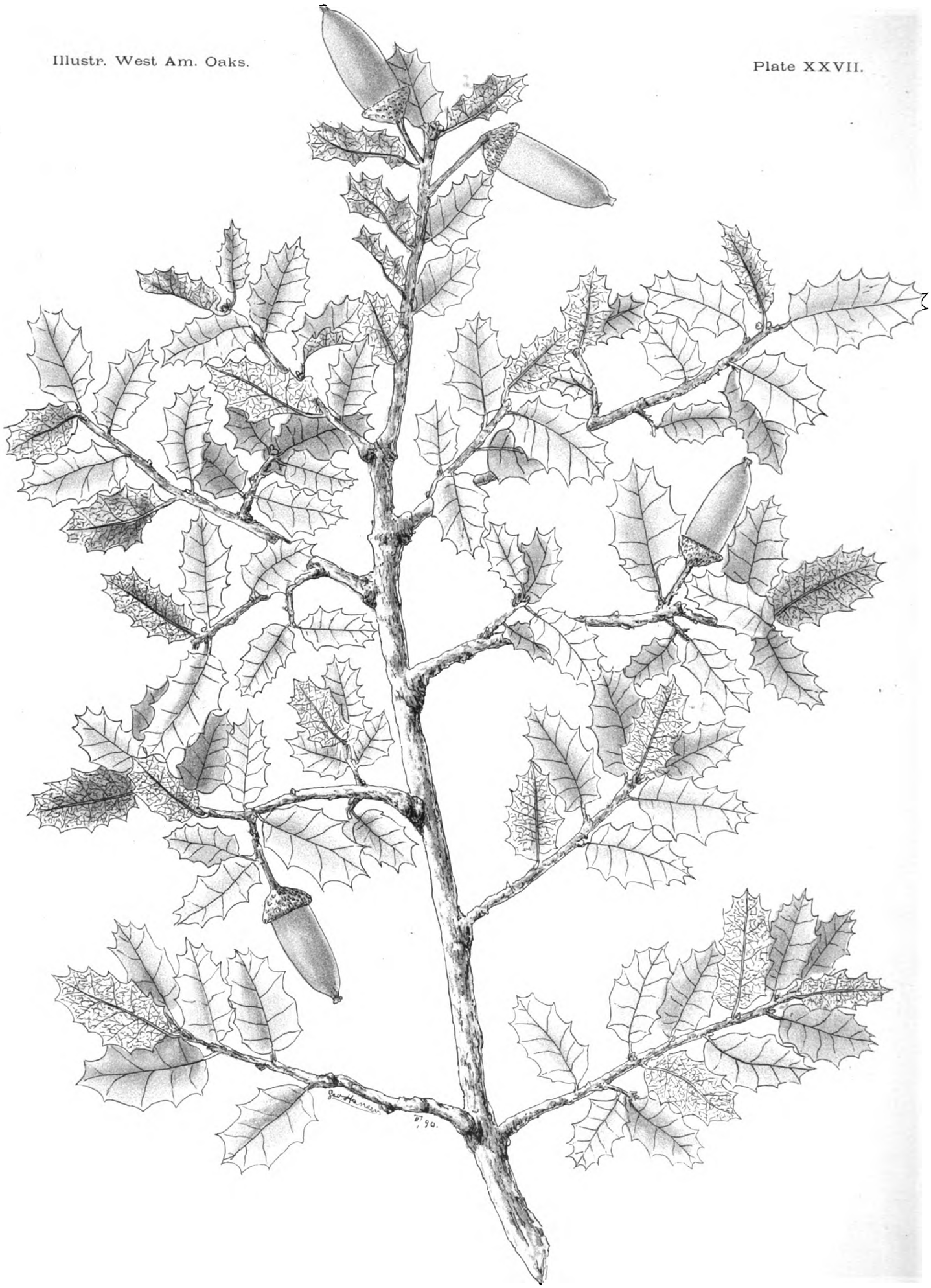
Habitat. Confined to a few islands of the coast, from Santa Rosa and Santa Cruz, off the City of Santa Barbara in the southern part of California, to Guadalupe far southward and off the Lower California peninsula; but not hitherto found on the intervening large islands of Santa Catalina and San Clemente.

Remarks. Being exclusively insular in its distribution, this is an oak of uncommon botanical interest. It is one of a very few arboreal growths which are endemic to our southwestern island chain, and which combine with a large number of shrubby and herbaceous plants, equally peculiar to the archipelago, to raise most curious questions of geological history, and of plant distribution on this side of our continent.

The type-trees of this species, if one may use such phrase, occupy a bleak crest near the northeast end of Guadalupe Island, where they were first seen by the well known botanical traveler and collector, Dr. Edward Palmer, in the year 1875, and were visited by the present writer ten years later. This crest of the island holds an elevation of some-

thing more than four thousand feet above the sea, and is kept cool and moist by heavy fogs which prevail during all the rainless season of the year. From within a stone's throw of where the trees stand begins that very precipitous descent, towards the base of which grow the palm trees peculiar to the Island. The oak trees apparently in the vigor of early maturity, are shapely, of middle size, rather compact in their growth, and my recollection is that there were not more than four or five of them.

In entirely different soil, and on the very opposite kind of exposure, namely, in certain dry, heated cañons of the southeastward slope of the Island, I observed other oak trees, of smaller foliage, and of a looser and less symmetrical habit. The two looked like different species; but Dr. Engelmann concluded them to be the same. The trees observed by me on Santa Cruz Island corresponded more to those of the hot cañons of Guadalupe than to those of the cool moist crest of the island. The acorn cups of the accompanying Plate are from the typical trees, and were brought by me in 1885 from the point above indicated. The branchlet with leaves is of the smaller-leaved form, and the specimen is from the Island of Santa Cruz.



QUERCUS TURBINELLA, Greene.

PLATE XXVII.

QUERCUS TURBINELLA, Greene.

BIBLIOGRAPHY.

QUERCUS TURBINELLA, Greene, West Am. Oaks, 37 (1889.)

DESCRIPTION. Shrub from four to seven feet high, with many rigid divergent branches; the branchlets rusty-tomentose: leaves oblong, an inch long or more, on petioles of two or three lines, coriaceous, plane, the margin with coarse acutely or spinosely tipped teeth, pale on both faces, somewhat glaucous above, stellate-tomentose beneath, conspicuously feather-veined and with a minute but strong recticulation which is most obvious beneath: fructification annual: acorns solitary, on peduncles from one-half to three-fourths of an inch long; cup turbinate, thin, scaly, not tuberculate, from four to six lines broad, embracing the very base only of the very long and slender nut.

REMARKS. Concerning the habitat of the precise type here described and illustrated, nothing is yet to be added to what was given on page 38 preceding. But a specimen closely resembling this was seen by me last summer in the herbarium of Mr. Samuel Parish of San Bernardino, California. He had collected this somewhere on the borders of the Mojave Desert. The leaves of this specimen are smaller than in the type, relatively broader and not quite plane. The acorns are also shorter. But this Mojave oak is no doubt specifically identical with the Lower Californian type; and the known range of the species is therefore in so far extended.

Again: well to the eastward of the Mojave Desert, in the northeastern parts of Arizona, occurs an oak like this in habit, but with a decidedly undulate (not plane) foliage, and clustered acorns whose cups are more nearly hemispherical than turbinate, of thicker texture, and a somewhat tuberculate as well as scaly surface. I found great abundance of this last summer in the neighborhood of Peach Springs, occupying the slopes and beds of heated cañons leading down to the Grand Cañon of the Colorado. I take this to be the oak which furnishes the small elongated very sweet and palatable acorns which even now find a place, along with the "piñones" or pine nuts, in the market places of the natives in some parts of Arizona. I suspect it may prove to be the *Q. pungens* of Liebmann: very probably a good species, to which our *Q. turbinella* may possibly have to be referred as a geographical variety or subspecies.

QUERCUS DUMOSA POLYCARPA, Greene.

PLATE XXVIII.

QUERCUS DUMOSA POLYCARPA, Greene.

REMARKS. On page 36 preceding I named and described the Santa Cruz Island scrub oak here illustrated. The insular type will be seen to differ somewhat from the original *Q. dumosa* in foliage and pubescence. The spicate inflorescence of perfect flowers is now proven to be a mere accident. While in Temecula Cañon, San Diego County, late in June last, I found ordinary *Q. dumosa* occasionally putting forth just such erect spicate inflorescence, and observed it to be a peculiar second flowering of the shrub. The *polycarpa* state is therefore a later abnormal inflorescence from a second growth of shoots. I doubt if acorns are perfected from these later spicate and apparently perfect flowers.

QUERCUS MACDONALDI ELEGANTULA, Greene.
(2. ENGELMANNI x DUMOSA.)

PLATE XXIX.

QUERCUS MACDONALDI ELEGANTULA, Greene.

REMARKS. This oak, named as above on page 26 preceding I now suspect to be of the nature of a hybrid between *Q. Engelmanni* and *dumosa*. Upon revisiting the Temecula Cañon, the original station, I found not only the tree whence my own specimens were taken in 1885, but several other individuals. The leaves are of much firmer texture than those of *Q. Macdonaldi* and are perhaps hardly deciduous. As collected by me at first, late in March, the twigs bore only young leaves not full-grown; but the old leaves may have fallen just as the new ones began to appear; and this is about as near as *Q. Engelmanni* and *dumosa* come to being evergreen. Both these species abound, and that in close juxtaposition, among the hills of the region named; and I have little doubt that what is here figured is but a natural cross between the two. What renders this the more probable is the fact that of the considerable number of specimens seen, no two seemed to be just alike, either in foliage or general aspect; and it is quite of the nature of hybrid oaks in general, that individuals of the same specific parentage differ greatly among themselves, some more like one parent, others more resembling the other.

The Kern County station for this oak, as given on page 26, is discredited. The neighborhood of Tehachapi, from which the specimens are reported to have come, did not yield to my search any such shrub or tree as this; and neither *Q. dumosa* nor *Q. Engelmanni* is found in that part of Kern County. The great elevation and peculiar climate render their existence in that locality entirely improbable.

QUERCUS UNDULATA, Torrey.

PLATE XXX.

QUERCUS UNDULATA, Torrey.

REMARKS. The present Plate has been engraved from specimens collected by the writer as long ago as 1873, near Cañon City, Colorado. The locality, although the most northerly one recorded for the species, is probably not more than a hundred and twenty or thirty miles from where Dr. Edwin James so long ago made the original discovery of the shrub. Dr. Britton has assured me that the branches here figured exactly correspond with the type specimens in the Torrey Herbarium. He also adds the significant note that no specimens exist there which answer to the engraving published in the Annals of the New York Lyceum. In view of these facts it has seemed very desirable that a new drawing, from authenticated specimens, should be made; and by an artist who, thoroughly appreciating the scientific value simple truthfulness in all such work, would add no grace or comeliness not borne by the scraggy bush itself. That we were not able to furnish Mr. Hansen with acorns of the species is particularly to be regretted, since those of the original figure referred to are manifestly somewhat conventional.

Concerning what should be regarded as the proper limit of *Q. undulata* phytographically and geographically considered, I begin to be in doubt. Perhaps the arboreal oak, *Q. oblongifolia* of Torrey which a year ago I followed Dr. Engelmann in referring here as a variety may be proven specifically distinguishable; but as Professor Sargent has lately said[1], it is a problem not to be solved until field work upon the oaks of southern New Mexico and Arizona shall have been renewed and perseveringly continued.

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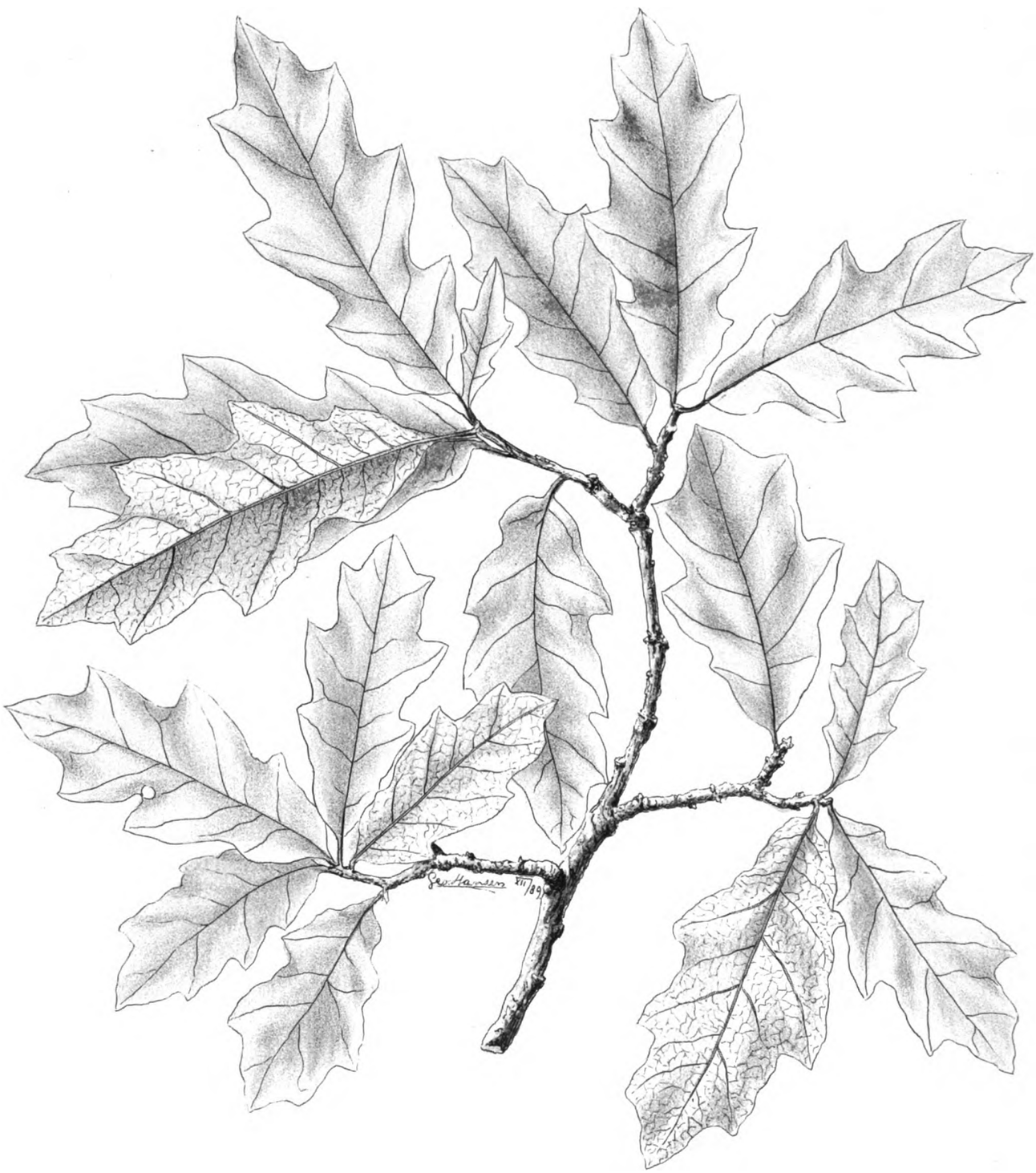
1 "Garden & Forest," ii. 471.



QUERCUS FENDLERI, Liebmann.

* * Deciduous White Oaks continued from page 26.

Plate XXXI.

QUERCUS FENDLERI, Liebmann.

Description. A loosely and irregularly branching rather slender shrub from one to five feet high: branches and branchlets of more than a year's growth clothed with a smooth and glabrous dark-colored bark; growing twigs stellate-tomentose: leaves membranaceous, dark green and glabrate above, pale and stellate-tomentose beneath, from two to four inches long, very short-petioled, of oblong outline (rarely a little broader above the middle), with a few, shallow, acute, mucronulate lobes: fructification annual, but mature acorns unknown; their young rudiments solitary or in pairs on a very short peduncle.

Habitat. Mountains of southern Colorado and northern New Mexico: plentiful near Trinidad, Colo., perhaps first collected by Fendler (his No. 805, *teste* Britton) not far from Santa Fe.

Remarks. This interesting little oak, so long confused with *Q. undulata*, is not only altogether deciduous; its leaves are of thinner texture than those of the equally deciduous *Q. Gambelii;* they are also of less than half the size of those of the last-named species. Occasionally one meets with rather acute lobes in *Q. Gambelii;* yet even in this case—and in the herbarium as readily as in the field—the light-colored bark of the branches marks all the states of *Q. Gambelii*, while in *Q. Fendleri* it is as uniformly of a dark iron-color. One might well describe the twigs as blackish.

The shades of foliage in the two, though less pronouncedly different, are perceptible to any eye. When I had descended from the mountains near Trinidad, where each species forms its own separate thickets, I could distinguish the several thickets of the two as easily at the distance of more than a mile, as when I had been in the immediate vicinity of them, by their respectively darker and lighter hues of green. *Q. Gambelii* even when only shrubby is much larger in all its parts, and more robust, than its obscurer and much less widely disseminated relative.

The present species is one of the last which was proposed by Mr. Liebmann, and I have not been able to see the paper in which it was published.

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QUERCUS VENUSTULA, Greene.

PLATE XXXII.

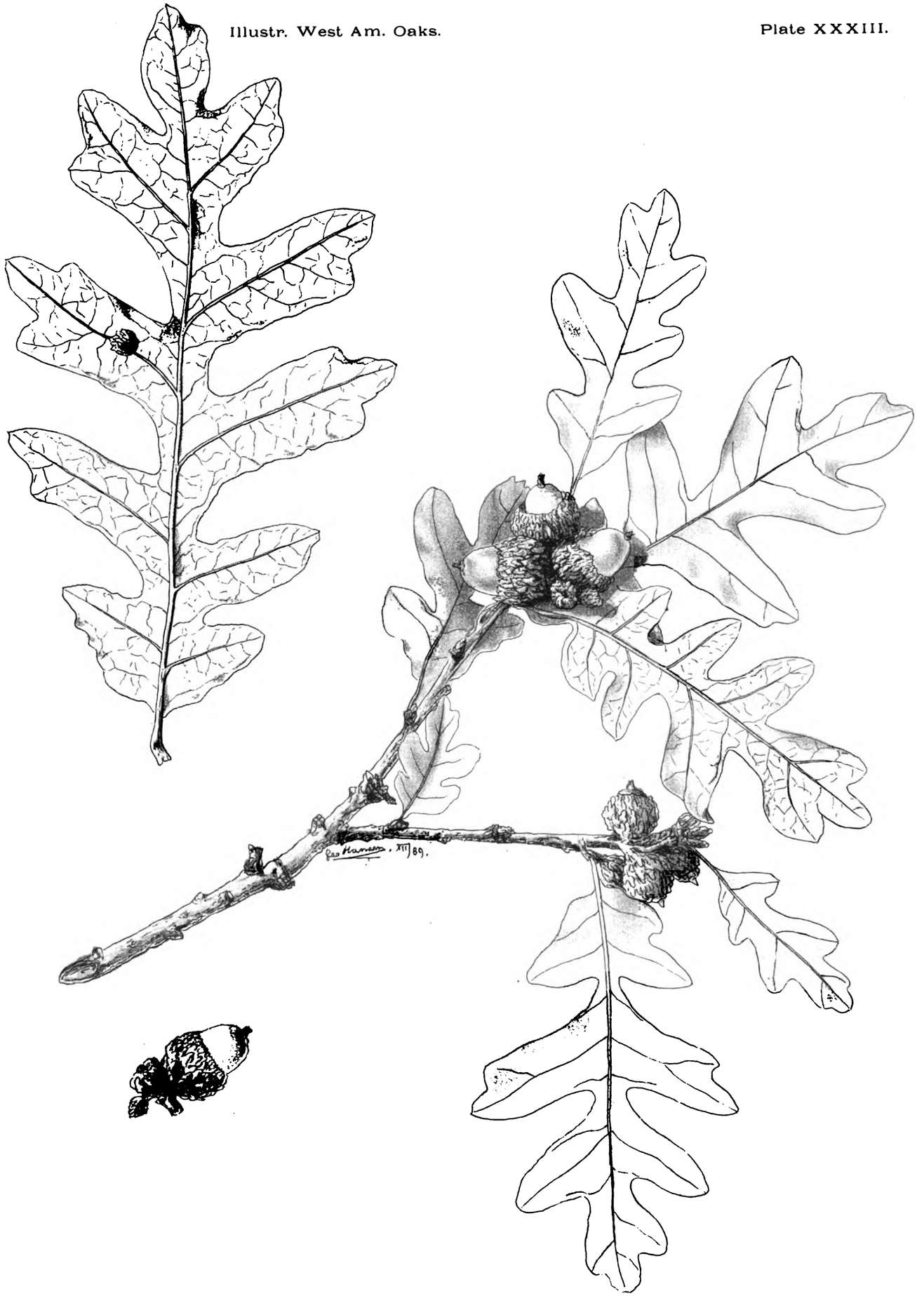
QUERCUS VENUSTULA.

DESCRIPTION. Shrub three to five feet high, but compact and symmetrical, the stoutish branches and very densely leafy branchlets short and ascending, the bark light brown and white-dotted, young twigs wholly glabrous: leaves much firmer than in the preceding, smaller, and of a lighter green, glabrate above, somewhat pubescent beneath with short stellate hairs, short-petioled and about two inches long, of narrow-oblong outline and somewhat deeply sinuate-lobed, the lobes rather numerous, obtuse: fructification annual: young acorns very numerous, more or less spicate; cups prominently tuberculate.

HABITAT. Mountains of southern Colorado and northern New Mexico; plentiful near Trinidad, and also on higher mountains further southward.

REMARKS. This, although always a small bush, is almost too neat and elegant in its appearance to be called a scrub oak. It was more plentiful in its region than its small associate *Q. Fendleri*, and is more nearly related to *Q. Gambelii*. Its profuse leafiness, very small leaves of peculiar outline, its singularly prolific fruitfulness—the acorns always appearing in longer or shorter spikes, and never solitary—and the whole bearing of the shrub mark it as more than a variety of *Q. Gambelii*. That species, although in its most reduced forms it is smaller than this, always retains in its more dwarf state, its own laxity of branching and its large obovate leaves. I have seen many acres of it not more than three feet high; but in this condition its leaf-character remains unaltered, and instead of being more prolific it is apt to be almost wholly sterile.

I regret having been unable to procure mature fruit of *Q. venustula*. From the greater size its growing acorns had attained by the middle of July I judge it to be either earlier in its flowering, or more hasty in the development of its fruit, than either of the other two species with which I found it associated in southern Colorado.



QUERCUS GAMBELII, Nuttall.

PLATE XXXIII.

QUERCUS GAMBELII, Nuttall?

REMARKS. The specimen forming the subject of this new Plate was obtained late in July 1889, in Bear Creek Cañon, near Morrison, Colorado, the locality representing about the northern limit of Oaks in Colorado. The individuals here, although quite arboreal in shape, exhibiting more or less of a distinct trunk and a shapely spread of branches, are but shrubs in point of size, few of them attaining a height of ten or twelve feet; but they make fruit abundantly.

The large tree of the higher mountains four hundred miles to the southward never exhibits the deeply lobed leaves with broad and somewhat angular sinuses and more or less serpentine midvein which characterize this northern state, or variety, and render it as to foliage the most beautiful of western oaks. Even in southern Colorado, where *Q. Fendleri*, *Q. venustula* and true *Q. Gambelii* meet, I have not seen leaves like those here figured. The form is perhaps peculiar to the lower mountains of middle Colorado. In its young and infertile states it has, however, a leaf-outline not so peculiar, nor so unlike that of the typical *Q. Gambelii*.

While I do not venture to give to this a new name, even as a variety, I can not repress a suspicion that it may ultimately prove worthy of such rank. But we have yet too many things to learn about qualities of the wood, possible characteristics of acorns, etc., in both this and the other supposed forms of *Q. Gambelii* throughout its vast range —a range embracing an empire's extent of country, no part of which has yet been well explored.

QUERCUS MACDONALDI, Greene.

PLATE XXXIV.

QUERCUS MACDONALDI, Greene.

BIBLIOGRAPHY.

QUERCUS MACDONALDI, Greene, West Am. Oaks. 25 (1889), excluding the variety *elegantula*.

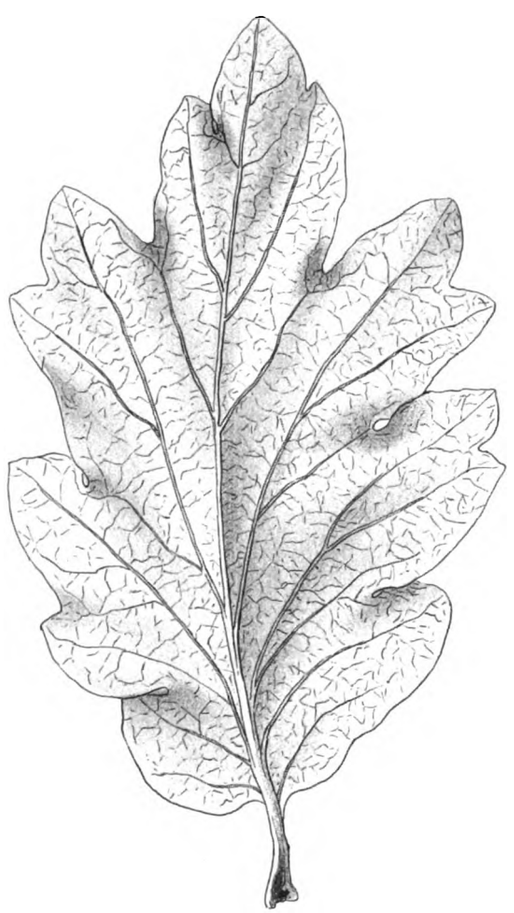
—— ——, Sargent in "Garden and Forest," ii, 471 (1889).

DESCRIPTION. A small deciduous tree, from fifteen to thirty-five feet high, the trunk rarely a foot or more in diameter, with a thin light gray bark which is rather finely rimose; branches and twigs slender, numerous, forming a gracefully rounded and somewhat compact head: branchlets and lower face of leaves minutely but closely stellate-pubescent; surface of leaves glabrate in age; leaves about two and a half inches long, on petiole of a half-inch, spatulate, the upper and broader portion sinuate-lobed, the lobes acutish and mucronulate, the lower and narrower portion entire, tapering either gradually or abruptly to the petiole: winter buds a line and a half long, ovate, acute, their scales indistinctly ciliolate: fructification annual: acorns sessile; cup rather deeply hemispherical, conspicuously tuberculate; nut ovate-oblong, acutish, less than an inch long.

HABITAT. Island of Santa Cruz, off the southern coast of California. Not many specimens were observed, but these grew near streams, in good soil, and, although trees of small or middle size only, were attractive by their symmetry and grace as seen among other oaks of less regular outline. They were fruiting only very sparingly; but the acorns were at least two-thirds grown at the time of my finding them, namely, early in August.

REMARKS. The species is dedicated to Captain McDonald, the munificent patron of these and other researches into the history of our western trees.

QUERCUS JACOBI, R. Brown Campst.



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1. QUERCUS JACOBI, R. Brown Campst.
2. QUERCUS GARRYANA, Douglas.

PLATE XXXV; also Fig. 1 of PLATE XXXVI.

QUERCUS JACOBI, R. Brown Campst.

BIBLIOGRAPHY.

QUERCUS JACOBI, R. Br. Campst. in Ann. and Mag. Nat. Hist. 4th Series. vii. 255 (1871).

QUERCUS GARRYANA, Macoun, Catal. Canad. 440, partly, not of Douglas.

DESCRIPTION. A middle-sized or large tree, branching from near the base and forming a compact head: trunk three feet thick, more or less, clothed with a rather thick fissured gray bark: branchlets short, stout, very leafy, tomentose pubescent: leaves broadly obovate; veinlets only gradually divergent from the midrib and directing the lobes somewhat digitately toward the apex of the leaf, which is broadest far above the middle: acorns ovate, less than an inch long, well inserted into a hemispherical scaly cup.

HABITAT. Islands in Puget's Sound, and on the adjacent mainland; also northward some distance beyond the British boundary; apparently often associated with *Q. Garryana*, its near relative with which authors have generally confounded it. Specimens collected near Steilacoom, Washington, in May, 1888, by Mr. C. V. Piper, and by him distributed as "*Q. Garryana*", though in young leaf and flower only, are of this species according to the venation, though not of the most pronounced type. A specimen from Cedar Hill, Vancouver Island, communicated to me by Mr. Macoun has a leaf much broader and more rounded than in the type, and cleft as it were into three main lobes, of each of which lobes the venation is of that almost palmate character which marks *Q. Jacobi* as distinct from *Q. Garryana*. The branch and separate leaf herein figured are from a new locality, on Lopez Island in Puget Sound. These were obtained at the instance of Dr. George Davidson, by his colleague on the Coast Survey, Capt. J. J. Gilbert. The peculiar veining and cut of the leaf are more pronounced in these specimens than they are in one which Mr. Macoun has sent me from the original tree on the grounds of Sir James Douglas upon which Mr. Brown based his species.

The Fraser River oak is described as being a mere shrub, and, having been referred to *Q. Garryana* by inference (no botanist having seen specimens), is more likely to be *Q. Jacobi*.

REMARKS. It may be hoped that the two plates now published, exhibiting so clearly the distinctions between *Q. Jacobi* and *Q. Garryana* will unable future explorers of those northwestern regions to identify the former, wherever it may be found, and so eventually determine its full range.

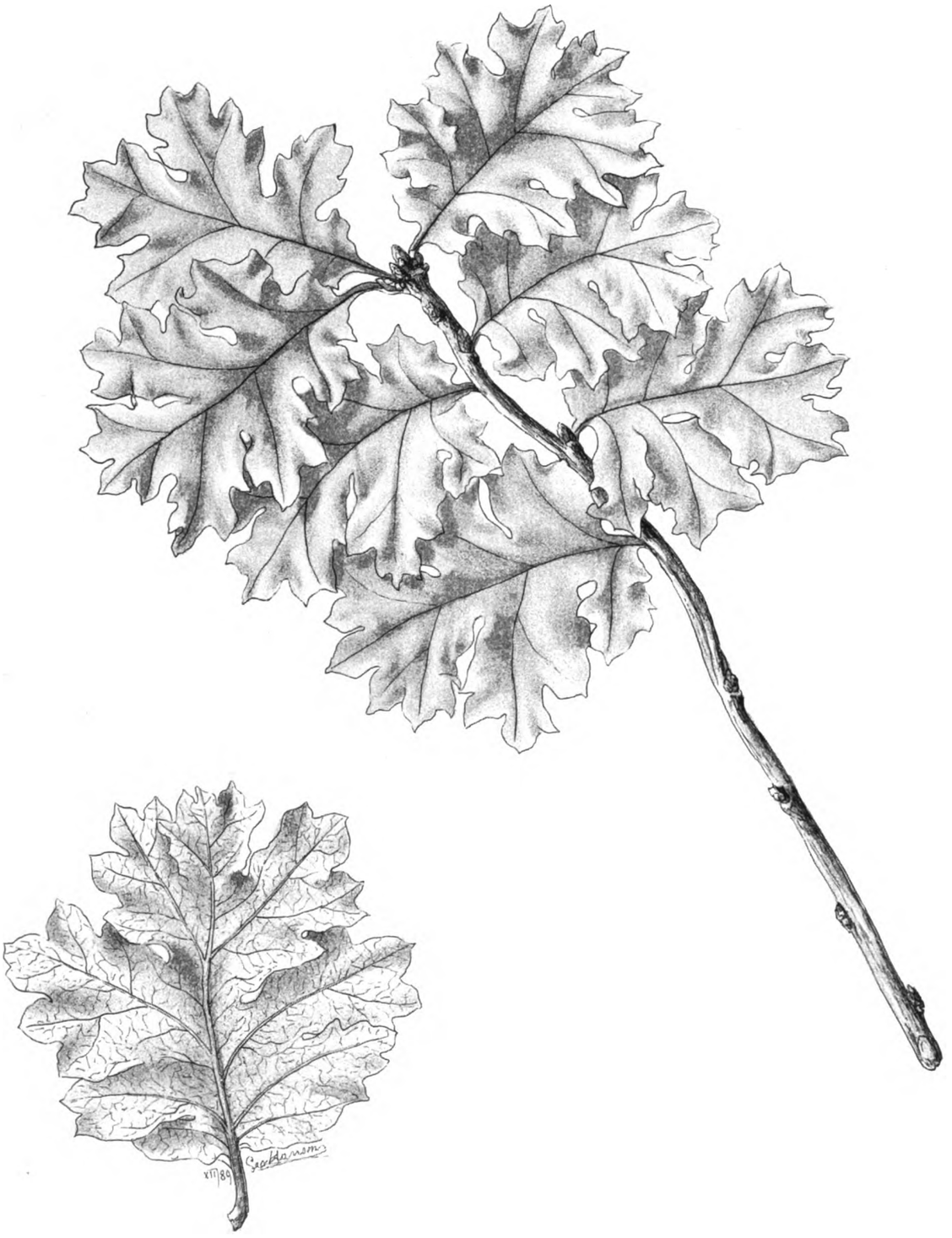
The two oaks differ almost as much in their acorns as in their leaves; those of *Q. Jacobi* being smaller and ovate, while those of *Q. Garryana*, just as shown at PLATES VII and XXXIV of this work, are thickest above the middle, i. e. obovate-oblong rather than ovate. They are sometimes almost oval, but I believe never ovate.

The volume in which *Q. Jacobi* was published appears to be rare in this country; and I have had both trouble and long waiting to obtain it. I shall therefore reproduce Mr. Brown's most important remarks concerning it:

"The only place where I ever observed it was in the southeastern district of Vancouver Island, on the lawn and close to the house of Sir James Douglas, along with trees of its close ally *Q. Garryana*, which afforded excellent material for comparison. The leaves of the species under notice, instead of being long and with three or four almost equal shallow lobes, acutely cut at the bottom, were more palmate, with five lobes, deeper and smaller than in *Q. Garryana*, the basal ones being broadest, the breadth of the leaf greatest at the middle. The form of the tree is also different. Instead of, as in *Q. Garryana* being bare of branches for almost twelve feet, it branches out near the base, the branching being much more umbrageous than in *Q. Garryana*. I was informed that the acorns were also different; and the one comes into leaf and flower later than the other.

Sir James Douglas, who was at that time Governor of British Columbia and Vancouver Island, had for many years noticed these trees growing alongside of *Q. Garryana*, and was quite convinced of the specific difference of the one to which, in memory of his long and unvarying kindness to me and other naturalists during our exploration of Northwest America, and in respect for the character of the founder of our North Pacific Colonies, I have attached his name."

The leaf and acorn of true *Q. Garryana* reproduced in figure 2 of PLATE XXXVI were brought by the writer from near Eugene City, in the southern part of Oregon; a point lying in what is about the centre of distribution for this species. David Douglas' type was from the Columbia River.



QUERCUS GILBERTI, Greene.

PLATE XXXVII.

QUERCUS GILBERTI.

DESCRIPTION. A depressed shrub with long wand-like and somewhat trailing densely leafy branches: leaves two inches long and nearly or quite as broad, deeply pinnate-lobed, the lobes closing the sinuses and even somewhat overlapping one another, dilated above and coarsely but acutely toothed or lobed; upper surface glabrous, shining but minutely rugose-reticulate, the lower face puberulent and with conspicuous veins and veinlets; petioles stout, two lines long: winter buds ovate, puberulent: flowers and fruit unknown.

HABITAT. On the rocky summit of Lopez Island in Puget's Sound.

Since the islands in the Sound are not at all likely to yield endemic shrubs or trees, this interesting new oak will naturally be looked for on the mountains of western and southern Washington, or even Oregon.

REMARKS. The cut of the foliage, with its numerous and very acute lobes, is altogether that of a member of the Black Oak series; and my first impression was that it would stand near the ordinary western deciduous Black Oak, *Q. Kelloggii*. But I am now convinced that it is truly a White Oak, and allied to *Q. Œrstediana*.

The almost orbicular general outline of the leaf, and its deep, crowded and even imbricated, doubly lobed margin are very striking peculiarities. But these are the leaves of sterile shoots, and the low trailing shrub which the collector, in his first letter concerning it, has spoken of as a "Vine Oak," so far as known bears no other kind. Nevertheless, one may dare to predict that, if the shrub is ever found in a more perfect state, the fruiting branches will exhibit leaves of a less complicated marginal indentation, and perhaps of a somewhat different general outline. In almost all our oaks, vigorous sterile shoots bear leaves far from typical.

In the Siskiyou Mountains early last September, while studying *Q. Œrstediana*, I observed and collected a low and slender scrub oak, which was fruiting plentifully, and which I could not refer to that species. This may possibly at some future time be identified as the fruiting state of *Q. Gilberti;* but the leaves are more elongated, the sinuses are open, and even those of sterile shoots were destitute of that peculiarly great relative breadth and fulness of margin which are so characteristic of the insular shrub here figured. The acorns are three-fourths of an inch long, oblong, obtuse, and but slightly inserted into

Judging from specimens sent by P. Su[illegible] from the mainland opposite Lopez Isd., Prof. Sargent pronounces this a "depauperate, stormswept plant not distinguishable from the common white oak of the region, Q. Garryana."

the very shallow-hemispherical scaly and not at all tuberculate cup. I hope that this little oak of southern Oregon may be proven the natural type of *Q. Gilberti*. I raise thus the question which future exploration must answer. But the leaves of the insular shrub are so peculiar that I shall not here presume to say positively that any other oak known to me can safely be associated with it under one specific name.

I scarcely need add that the colleague of Dr. Davidson, Capt. J. J. Gilbert of the United States Coast and Geodetic Survey, who did us such excellent service in the matter of *Quercus Jacobi*, is the discoverer, and thus far the only collector, of this oak which bears his name.

ADDITIONAL NOTES.

QUERCUS KELLOGGII, Newberry. In the various descriptions of this oak nothing is said of any pubescense. This silence is the equivalent of saying that the twigs and foliage, in their mature state at least, are glabrous; but they are not always so. On the southern slope of Mt. St. Helena, in September, 1888, I observed certain young trees of this species, whose foliage, certainly at that date quite mature, was cinereous or perhaps more nearly hoary, with a white tomentum.

In respect to the outline and lobing of the leaves, the species exhibits many diversities, as also in the size of the acorns and the depth of the cup; and in some parts of California good amateur observers recognize what they suppose to be two distinct oaks—different in habit as well as in leaf-outline—growing promiscuously, but which botanists call alike *Q. Kelloggii*. Very probably several varieties may have to be distinguished and supplied with names.

QUERCUS MOREHUS, Kellogg. At page 47 preceding I have said that *Q. Kelloggii* does not occur in the range of hills lying back of Oakland and Berkeley; and that having found *Q. Morehus* in these hills, the probability of its being a hybrid between *Q. Kelloggii* and *Q. Wislizeni* is reduced to a minimum.

A further exploration of the more northerly continuation of the Berkeley Hills has now brought to light a plentiful growth of *Q. Kelloggii* on the banks of the upper part of San Pablo Creek; and this at a distance of not more than two miles from where I had formerly found *Q. Morehus* and *Q. Wislizeni* growing in stunted condition, and forming thickets side by side. I have also discovered near the San Pablo habitat of *Q. Kelloggii*, one large tree of *Q. Morehus*. I have also noted that the leaves are scarcely found quite the same in shape on any two trees of the species last mentioned. I therefore conclude it must be of the nature of a hybrid. By its persistent leaves it seems as if it partook more of the nature of its evergreen than of its deciduous parent.

LIST OF PLATES.

ERRATA.

Page ix, line 6, *dele* which.

" 19 (opposite Plate xi), for Hon. B. Redding, read Hon. B. B. Redding.

" 41 (Plate xxiv), line 4, for Bot. Buch, read Bot. Beech.

INDEX OF SPECIES.